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[OFFICIAL NOTICE.]

## New England Association of Gas Engineers.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS,
OFFICE OF SECRETARY, 26 CENTRAL SQUARE,
EAST BOSTON, MASS., Jan. 16, 1907.

The Thirty-sixth Annual Meeting of the New England Association of Gas Engineers will be held at Young's Hotel, Boston, Wednesday and Thursday, February 20th and 21st, 1907. Papers by several men prominent in the industry are being prepared, and several topics likely to bring out a lively discussion are being arranged for. An excursion to some of the largest gas power plants in this part of the country can be had, if the members wish it. Persons wishing to join the Association are requested to send their names to the Secretary. The annual dinner will be held Wednesday evening. More detailed announcement will be made later.

N. W. GIFFORD, Secy.

## BRIEFLY TOLD.

SCORE ONE FOR SECRETARY MCMANUS.—One of the latest ukases delivered by the estimable lawyers, comprising or composing the New York State Commission of Gas and Electricity, is to the effect that all gas companies of the State producing 15,000,000 cubic feet or more of artificial gas, or distributing natural gas, were required to show cause before the Commission last Wednesday why such companies should not be required to instal equipment for testing the candle power of the gas supplied. It was very stormy last Wednesday, which may have been the cause that the attendance at the hearing was very slight, save in respect of representatives of the Consolidated Gas Company, of New York, the Brooklyn Union Company, the Albany and Troy Companies. The estimable Commission was given some good testimony by Mr. G. H. Woods, of the engineering staff of the Consolidated, and Col. F. S. Benson, of the Brooklyn Union. Dr. Elliott, of the Consolidated, was also in evidence. Of course, neither of these Companies lacks anything in the photometrical line of equipment, and we are satisfied that the lawyer-Commissioners know considerably more about the things under consideration than they did before, and probably more than they thought they ever would know. However, as there will be greater mention made of the hearing when the testimony is all in, we may now take our leave of it by remarking there is no doubt that every artificial gas company sending out considerably less than the specified volume of gas yearly should have a photometrical rig, if only for their own guidance; but we fail to comprehend why a natural gas company should be required to outfit itself in similar manner. Indeed, Mr. John McManus, Secretary and Treasurer of the Buffalo Natural Gas Company, when asked his thought respecting the suggestion of the Commissioners with regard to natural gas companies, put the thing in a nutshell—and the covering to the kernel was a small one at that—by replying: "The equipment is not only unnecessary, for it is superfluous."

THE LAST VOLUME OF "PROCEEDINGS," WESTERN GAS ASSOCIATION.—We are indebted to the attention of Mr. James W. Dunbar, Secretary of the American Gas Institute, for a copy of the "Proceedings" of the Twenty-ninth annual meeting of the Western Gas Association, which was held in Cleveland last May, and which was the occasion of the ending of the Association's separate activity. It is with great regret we exclaim to it, Vale; but it is with exultation we add *valete ae plaudite*. The book is like its predecessors, accurate in report and irreproachable in makeup, and the gentlemen of the Committee on Publication (Messrs. O. O. Thwing, Alten S. Miller, Wm. McDonald and Jas. W. Dunbar), who compiled and arranged the "Proceedings" of the Association, from its straggling inception to its glorious swan song, nothing but praise in unstinted measure must be given. It was no ordinary task that was set before them, and even the greatest caviller in the world may not truthfully say that their success was not even as great as the task was hard. Members may obtain copies by applying to the Secretary at his address in New Albany, Ind.

CURRENT COMMENT.—

MR. F. A. NOBBE, Secretary of the Louisville (Ky.) Gas Company, has informed the shareholders that the transfer books will be reopened to-day.

THE Baltimore Company is considering the advisability of extending its mains to the outlying village of Towson.


LIBRARY OF CONGRESS JAN 21 1907 SMITHSONIAN DEPOSIT.

MR. F. A. SHELTON, writing to the Sullivan Brothers, of Flushing, L. I., respecting certain pipe laying work done by them for him at Jenkinstown, Pa., said: "You are entirely at liberty to refer to us as satisfied with the character of your work and methods, as found in our Jenkintown experience."

"F.," writing from San Antonio, Tex., under date of the 12th inst., says: "The San Antonio Gas and Electric Company, and the San Antonio Traction Company, treated its office force to a Mexican supper and an evening at the Majestic Theater some evenings ago. About 60 men and women accepted the invitation."

AT the annual meeting of the Cranford (N. J.) Gas Light Company the officers elected were: Directors, John Kean, Julian H. Kean, Francis Engel, F. H. Price and H. B. Udell; President, John Kean; Treasurer, Julian H. Kean; Secretary, H. B. Udell.

A CHARTER has been issued for the Red Lion and Dallastown (Pa.) Gas Company. It is capitalized in $40,000.

THE gas rate at St. Catharines, Ont., has been reduced to $1 per 1,000 cubic feet for all account and use.

MR. WALTON CLARK, Engineer-in-Chief of the United Gas Improvement Company, delivered a most interesting lecture on "The Gas Problem in Philadelphia" the afternoon of the 12th inst., before a large and attentive audience, in the lecture hall of the City Club. The main points in the discourse were excellently italicized by means of most convincing lantern slides as to the present and past condition of the Philadelphia city gas works, before taken over by the U. G. I. Company and after that taking was an accomplished fact. The lecturer told the story, the pictures proved it.

WE regret to record the death of Mr. Griffith P. Owen, for 23 years a faithful and successful employee of the Utica (N. Y.) Gas and Electric Company. His death occurred the afternoon of the 9th inst., and his age was 54, having been born in Whitestown, N.Y., August 22, 1852.

THE Linton (Ind.) Gas Company has been incorporated by Messrs. John O'Donnel, August Koring and H. C. Stivers. It is capitalized in $100,000.

MR. EMANUEL LEHMAN, at one time Vice-President of the East River (N. Y.) Gas Company, died at this home in this city the morning of the 10th inst. He was in his 80th year, having been born in Bavaria, Feb. 15, 1827. Emigrating to America in 1846, he subsequently became a member of the firm of Lehman Brothers, which in time became one of the largest cotton trading firms in America. He was noted for his charities, and it is not outside the truth to say that in his time he was one of the best known Hebrews in America. Four children survive him.

THE action of the Directors in the Brooklyn Union (N. Y.) Gas Company, in suspending wholly any dividend return on its shares until the law has finally determined whether or not the 80-cent gas rate is in line with the law, is the subject of much adverse comment. The Company undoubtedly could make *some* return to its shareholders.

MR. C. H. SWING has resigned from the service of the Chester County (Pa.) Gas Company to take charge of an important section of the work of the Jacksonville (Fla.) Company.

SUPERINTENDENT MACMUN is happy in the occupying of offices suitable for the transaction of the business of the Company. The old establishment did not have much to recommend it from any point of view.

THE proprietors of the Suburban Electric Light and Heating Company have reduced the gas rate in San Leandro, Cal., to $1.50 per 1,000 cubic feet.

MR. L. S. HARVEY, County Attorney of Miami, Kas., informs us that on the 3d inst. he was granted a franchise by the authorities of Junction City, Kas., for the construction and operation there of a gas plant. The franchise is to run for 20 years, and construction work will be commenced about March 1st.

PRESIDENT KENAN'S address, on the occasion of the banquet given some evenings ago by the Executive Committee of the Union Gas and Electric Company to the Directors of the Cincinnati Gas and Electric Company, was all to the toast, and the oratorical effort of Mr. Henry L. Doherty was an excellent flight. The banquet was held in the banquet hall of the St. Nicholas, and it was in every sense enjoyable and enjoyed.

MR. J. D. SHATTUCK, writing from Chester, Pa., under date of the 12th inst., says: "Will you please give me space to make the following correction in my report on high pressure distribution as read before the American Gas Institute. The formula accredited to Mr. Lowe was copied from a previous formula that was derived by Mr. Cox not "Coxe," as printed in this report. Mr. Cox derived this formula from D'Arcy's formula, nearly 8 years previous to the year that I first gave Mr. Lowe credit for the same. Mr. Cox's last formula for gas is

$$2 = 33.3 \sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times W}}$$

where d = diameter of pipe in inches.
$p^1$ = absolute initial pressure in pounds per square inch.
$p^2$ = absolute terminal pressure in pounds per square inch.
L = length of pipe in miles.
W = specific gravity of the fluid when air = 1.

[AS FURNISHED BY THE OFFICIAL STENOGRAPHER.—Concluded from page 52.]

## PROCEEDINGS, FIRST ANNUAL MEETING, THE AMERICAN GAS INSTITUTE.

HELD IN THE AUDITORIUM HOTEL, CHICAGO, ILLS., OCTOBER 17, 18 AND 19, 1906.

### SECOND DAY—AFTERNOON SESSION.

COMMUNICATION FROM MR. GLASGOW, REGARDING ELECTROLYSIS.

The President—We will now listen to a letter from Mr. A. G. Glasgow in relation to his report on Electrolysis, and as Mr. Glasgow is not here to present it, I will ask the Secretary to read it, and the same will be published in the Proceedings.

The Secretary read as follows:

LONDON, S. W., Sept. 26, 1906.

JOHN WILLIAMSON, ESQ., 157 Michigan avenue, Chicago, U. S. A.—My dear Williamson: I find I shall not be able to return to America in time to attend the next and last meeting of the American Gas Light Association, so I wish you would take charge of the presentation of our electrolysis report. I think we should arrange for the continuance of the Committee by the Gas Institute, inasmuch as this question of electrolysis is a very live issue, and information is continually accumulating regarding it—not only in America but in all parts of Europe. It will, therefore, I think, be useful for us to submit additional reports from time to time (not every year) bringing the status of this subject up-to-date. I am very sorry indeed that I shall not be with you this year, and I wish the last meeting of the American Gas Light Association and the first meeting of the American Gas Institute all possible success. It is a case of "The King is dead; long live the King!" With kind regards, yours very sincerely, A. G. GLASGOW.

*Discussion.*

The Secretary—I will state that this report which was made to the American Gas Light Association has been printed and forwarded to the members of the Association. I move, Mr. President, that this report be included in the Proceedings. [Seconded.]

The President—Gentlemen, are there any remarks?

Mr. Miller—If Mr. Brownell is present, it may be interesting to hear what he has to say about this report.

The President—It is stated, Mr. Miller, that he has left the city. Are there any further remarks?

Mr. A. S. Miller—Mr. Chairman, as is well known, there is a very radical difference of opinion as to the best method of handling the currents on gas mains. I am very much interested in the subject, and hope to hear something from some of the people present who are of the same opinion as the writers of that report on electrolysis. A great deal has been said about the bad effect of taking the return current from the pipes by wires, but nothing has been offered us in its place. I stand here as the champion, or rather as the representative, of those who have tried to make the best of a bad job by taking the current from the pipes by wires after it has gotten on. While in a measure I am in accord with the members of this committee, in the view that it is not a good practice, but, so far as I can find out, it is a great deal better than to leave the current on. I would like very much to hear from some of the members of the Institute whose ideas differ from mine. I would like to know why they leave the currents on the pipe and let them find their way off, when, as a matter of fact, we all know that you cannot keep the current off the pipe in the beginning. As I understand the substance of the report, it is that you ought not to let the current get on the pipe. I quite agree that we ought not to allow it to get on the pipe, and the question has been, of course, how to prevent that. I have yet to find out how we can keep it from the pipe.

Mr. Egner—How does Mr. Miller deal with the current to keep it off the pipe; with wire.

Mr. D. McDonald—I would like to ask if any of the members of this Institute have tried the plan of sueing the electric railway companies for the damage done to the gas pipes. As this is a subject in which I am vitally interested, I want all the information I can get. I do not want to bring an injunction if it is not going to amount to anything, and I am not going to sue them for damage done to service pipes unless I know pretty well where I stand. I would like to know if any of the members who have had trouble of this kind have succeeded in making the railways pay for it. If they have, and that could be made generally known, I believe it would be one of the best means for stopping this trouble with electrolysis.

The President—Mr. Egner asks for information as to the method which Mr. Miller has used.

Mr. A. S. Miller—We found certain centers in our territory where there was a decided difference in the voltage between our pipes and the tracks, and at this point we attached our mains, and the water mains and underground cables, to copper returns, which in turn were carried back to the negative or ground side of the rotaries of the electric railway company. The railway company has worked with us, has furnished the copper returns, and has been entirely reasonable and fair with us in everything that we have asked it to do. The result has been that we believe we have substantially stopped the electrolysis in the sections where we are connected up in that way without increasing the difference in the voltage between our pipes and the railway tracks at any other point. By connecting in the water mains and underground cables we are carrying such a small amount of current on our pipe that it is almost impossible to measure the drop around the joints or on any short length of pipe including the joint. I would like to know what disadvantage there is in that method.

Mr. W. Forstall—Bearing upon the point that Mr. Miller just described, as to the action of the trolley company in Baltimore, it might be interesting for me to state here that in Philadelphia some examples of the effect of electrolysis were brought to the attention of the trolley company, and we presented a bill to the trolley people for the damage, who apparently were very glad to settle it. The attitude they seemed to take was that it is a disgrace to a trolley company to allow their current to escape, and they were willing to pay the bill. It may be said that the roadway construction there is of the very best. In other words, their rails are of very large section, well bonded, and in many cases incased in concrete. In addition, about every 300 or 400 feet, a copper wire is bonded to the rail, run into a manhole and returned through a conduit system to the power house, so that there is very little chance for the current to escape to the mains. On about 1,300 miles of mains we have had only one or two cases which afforded us any ground for complaint.

Mr. D. McDonald—I am very much obliged indeed to Mr. Forstall for that statement. In the town where I am located the electric railway company denies it is its current. They say that it may come from the telephone, or from lightning, and that it is for me to prove it is their current. I think the attitude of the company which Mr. Forstall has just described is very progressive, and when all the railway companies take that attitude the difficulties of the gas people with electrolysis will be pretty largely done away with; but as long as our mains are used for the passage of the return electric current, and as long as the railway companies continue to have their own way about it, the result will continue to be that we will have trouble one way or the other, and the people who make the trouble are the ones who ought to pay for it.

The President—I would like to hear an answer to Mr. Miller's inquiry as to whether the method he described is a correct method. I would like to know something about that myself.

Mr. Stone—While I was not going to answer Mr. Miller exactly, I was about remarking that we, having been troubled somewhat by electrolysis, were a little bit in doubt about the best method of handling it. I had an examination made of the property by two experts, or by two gentlemen who thought they were experts in that line, and one gave an entirely opposite opinion to the other as to the proper way to handle it. One of them said to bond the pipe, the other said to insulate the pipe. I am just as far ahead now as I was before I asked them what to do. I think anyone who looks into the subject will find himself in just that position. There does not seem to be any hard-and-fast rule laid down as yet to be pursued in this matter. Regarding what Mr. McDonald said, I think it is all right to send a bill to the traction company for the damage, provided you know who to send the bill to, but when you have two or three interurban companies operating in a town, together with the local company, each one of whom says it is the current from the other company that is making the trouble, it is pretty hard prove it is not.

The President—What did you finally do?

Mr. Stone—We finally insulated the pipe and have had very good success. At least we have got the amount of electricity that we are carrying down to a point where I think we will have very little trouble. We have had no success at all in making any of the traction companies admit that it was their current which was damaging the pipe. They all fought shy. In a case where two or three companies are operating in a town, and especially where the power is supplied from different stations, there are different times in the day when you will get the current from one company, and at some other times of the day you will get the current from the other company. It is a hard proposition.

Mr. G. S. Carson—In regard to Mr. Miller's statement as to putting in copper returns from the gas pipe to the street railway station, I would like to ask if, as a matter of fact, it would not act as a path for any surplus current that might come over the wire. In other words, if there was resistance built up at any point on the rails the current would take the easier path, and come by the gas and water pipes around through the copper wire for a part of the distance. The fact that there was no difference in voltage would not seem to me positive proof that no current was flowing. I would like to ask some electrician here who has made that a study if such would not be the fact.

Mr. A. S. Miller—It is quite true that if there is an increased resistance along the rails more current will flow through the pipe, and connections of that kind should be made with great caution and should be very frequently inspected. The connections that we have made are made so that we can put ammeters on the line, or rather on the return wires at frequent intervals, and test the amount of current flowing. That is done every few weeks. We test the current to see whether the railway company is keeping up its part of the agreement. We have found at times that the bonds get broken. Our apparatus is arranged with switches, so that in case the current gets too heavy at any time we can open up the switch and, therefore, increase the resistance on our line.

Mr. D. McDonald—If I may speak on the subject again, I should like to say that I have read very carefully the report prepared by the committee of the American Gas Light Association in regard to the prevention of electrolysis, and I feel, as I think a great many gas men are coming to feel, that it is decidedly bad policy on the part of gas companies, as a general thing, to allow the impression to get out that they have to take care of the electric current, or that it is their business to take care of any part of the electric current coming from a street railway system. There is a tendency among all of the electrical engineers apparently to make it appear that the street railway's part is fulfilled when they generate the current, and that the matter of taking care of it afterwards is something with which they have no concern, and that it can go out and do anything it wants. We sat still and allowed it to damage our pipes, and said nothing at all about it. I feel we are not bound to go to them on our knees and ask what we shall do. We have had no satisfaction so far, and I think we ought to force a test case of some kind and press it to a final conclusion in our highest courts so as to enable us to protect ourselves. I do not think it is up to us to go to the expense of taking care of the current coming from electric lines. It is up to the street railway companies to take care of what they generate.

The President—Is there to be any further discussion on this subject?

Mr. Egner—I merely wish to say I was very glad to hear that a gas man like Mr. Miller has adopted the system which he described. I proposed it more than 10 years ago, and I am still talking about it. Ten or 12 years ago I investigated and was impressed with the advantages of that system.

Mr. Miller—If I may have the last say, Mr. President, I had that in use 12 years ago in Oil City, Pa.

Mr. Egner—Well, I do not know about the date to a certainty; but that is a plan which I have been recommending for a long time.

Mr. D. McDonald—I have had it in use about 5 years, and during that time I have become satisfied that you simply transfer the location of the trouble and do not get rid of it.

Mr. Stillson—I would like to see this discussion carried a little further. I would like to know what success has been met with, from the use of insulated pipe or insulated couplings, that will prevent the current from flowing on our services. If something can be done in that line, I would like to hear what results have been obtained from anyone who has it. After hearing them I would like to state the result of some tests which I made.

The President—Mr. Stillson wants to know what success insulated couplings have met with, and has some more remarks to make after his question is answered. Can anyone enlighten him on insulated couplings? Somebody in the room must certainly have used insulated couplings.

Mr. Stone—I do not like to talk too much about this subject. I have used them, and so far as I know they seem to work all right. They reduced the amount of current on the line to a minimum. While the couplings have not been on for a length of time sufficient to tell definitely just what the result will be from what tests we have made since putting on the couplings, they seem to show they will answer the purpose and do the work.

Mr. Morton—I should like to ask Mr. Stone how far apart he puts the

insulated couplers. It seems to me that the distance between would have a considerable effect upon their efficiency.

Mr. Stone—We have a line laid with the ordinary coupling joints, and it has no electric current at all. On the line that we insulated we put them in every 400 or 500 feet.

Mr. Goodnow—We have had some experience in this line. On a part of our high pressure distribution system we had to combat this trouble. We have had occasion to renew portion of a line about 13 miles long, and as a means of prevention we have put in about 3 miles of 6-inch enameled pipe. That is just about completed, and the object was, of course, to insulate the pipe from the current traveling in the ground. We expect this to prevent the current getting on the pipe, and, therefore, not being obliged to leave it. We also, at another point further down, have put in insulated joints in enamel pipe in connection with a patent coupler. Previous to insulating it we found a very large amount of current traveling on this pipe. The trolley tracks in the vicinity were in very bad condition. They were improved, however, and also changed from single to double track, which, of course, made a much better condition of affairs, and with the introduction of these joints in the line there has been a decrease of current in some instances of from 80 per cent. to 90 per cent. This state of affairs has been going on for about 6 years. We are awaiting results from what we call enamel pipe, which is pipe enameled and baked twice on the outside. What result we will get from that can only be told by continued use, and we hope to know more about it in a year or two.

Mr. D. McDonald—I move that it is the sense of the members of this Institute based on experience that nothing that the gas company can do will protect our underground pipe system from destruction by electrolysis as long as the street railway companies use the earth for the return of their current. I would like to offer that as a resolution so that we may go upon record as taking action in regard to this matter.

The President—There is a motion before the house, Mr. McDonald. That would be out of order, I think, at this time.

Mr. D. McDonald—Then I will withdraw it for the present. Any testimony that we can give will aid us at some future time, and if we can protect ourselves it is our legal duty to do so. I would like to see some action started.

Mr. J. D. von Maur—There are about 50 miles of high pressure, wrought iron pipe around St. Louis, and it is all equipped with insulating couplings placed every 300 feet. The pipe has been in the ground for a period of 18 months, and thus far no trouble has been experienced from electrolysis. Where the pipes pass under street railway tracks several insulating joints are placed between the lengths on both sides of the track, and at least one length of pipe is boxed in and surrounded with pitch. In one case, where the insulating joints were omitted on either side of the track, the pipe was very badly eaten out. I do not think we can say anything final on insulating joints as yet, but the above has been our experience to date. We expect to make an electrolytic survey in the near future.

Mr. Witherby—There is no other question which affects the gas industry more than this question of the effect upon underground mains of electrolytic current. The gas company was in the field first in almost every case. The electric railways companies came in secondarily. It seems to me fair that the man who was on the ground first should have the best right, and there is no reason why the gas mains should be used as a return feeder, or that they should be used as wires, whichever way you may wish to term it, for the purpose of bringing the current back to the trolley company's power house. The trolley companies should be made to put in the return feeders themselves that will be capable of carrying the return current. If they will only do that, which they can do very readily, it will take care of most of the trouble, or at least 95 per cent. of it. They fight it on the ground that it is expensive. Copper does cost money? And they refuse in a great many cases to even co-operate with the gas or water company, which they will probably continue to do until forced to define their position, or are threatened with heavy damages. Some of the trolley companies have been co-operating with the gas and water companies, and have removed the trouble so far as it is possible to do, but in other cases they have absolutely refused and declined to have anything to do with it. I think this Institute ought to go on record, and, if it cannot be done in any other way, we ought to bring a court proceeding and make a united effort at some one point where our position will be fairly safe to make a test case and force it through until the courts of the United States make a decision.

Mr. Rice—I am very glad to hear these remarks on the legal side of this question. I will say no more on that side of it except to indorse the sentiments which have just been expressed very heartily. I think that the attention of this Institute should be directed very strongly to the Peoria case—the first case mentioned in the Report of the Committee on Electrolysis. I had the privilege of talking recently with one of the attorneys in that case. The report of the Master-in-Chancery was favorable at all points to the position of the water company—of course, the water company would stand in the same relation as the gas company would in such a matter. The trial judge (Judge Grosscup), however, removed this case from the Master-in Chancery, which, I understand, was a very unusual proceeding in such instance. He removed it on the ground that he wished to hear more testimony; this was in 1901. Five years have passed by without a decision. Petition after petition has been sent up to this judge asking him to reach a decision in the case. One of the gentlemen here has spoken about a test case being brought. Here is a test case. Here is a case which raises all the points which should be brought out. They are brought out well in this case. It seems we might do something towards lending our influence, either severally or jointly, towards bringing this particular case to a conclusion. The conclusions of the master were favorable, and eventually it would seem as if the conclusions of the judge must also be favorable.

Mr. Witherby—This is not a thing, as I view it, that we should leave in any sort of unfinished condition. We ought to be sure of our rights and then take a stand one way or the other. Many small gas companies to-day are losing thousands of dollars annually because of this trouble with electrolysis. Many of them perhaps have not come to a full realization of the extent of the damage which escaping electricity is doing to their services, and may not until they find their entire system is broken down. They find stray appearances of it once in a while, or may find sections of pipe which they have to replace. They take these out, putting them away possibly as witnesses for some future time. The specimens are in sight about a year, then they are thrown into the waste pile. In some of the more extensive systems, where the damage from this source has become serious, negotiations are pending between the street railway system and the gas company as to a final settlement of the difficulty. I think this Institute should come to the front and place itself in a position which cannot be misunderstood.

Mr. Graf—Can any gentleman tell me what would be the increased cost in the trolley construction in order to provide a proper return feeder? We know about what it costs us to return this current on our mains. What would be the increased cost to the trolley company per mile of track? What percentage would it be—5, 10 or 15? If we can get it in percentage we can get it down to dollars and cents.

The President—Will anybody answer Mr. Graf's question?

Mr. Witherby—I do not know that I can give the exact figures, but it is entirely a question of the amount of current that the trolley company is using and the number of feeders it already has in position. I know a case where the gas company and the railway company looked over the situation in some way, and I think it was found that the trolley company would have to expend, in order to put in the necessary amount of feeder wire, something like $100,000. Nothing came of it. It is a matter of indifference to them how the current gets back or whether they use the gas or water company's mains; but they were not going to the expense of putting in copper to stop it. As to the actual percentage, it would be hard to state it. The same size of feeder wires would carry a return current for most any size of pipe. It would protect a 4-inch line or a 30 inch line, and so you can hardly use that as a basis of comparison. The existing condition in any particular locality that must be met must be looked into carefully and properly worked out. I think the more up-to-date railroad systems of the country to-day are placing pretty nearly the proper amount of copper that is required; but on trolley roads in smaller places, and on some of the interurban lines, little or no attention is paid to the matter. They do not seem to care very much what damage they inflict on the other fellow.

Mr. Summers—Is it not true that some of the trolley companies have been carrying on experiments along their lines so as to get at data for making the feeders effective? I think I have heard of that. In fact, I know of one company which established an experiment of that kind, but how successful it was I do not know, or how extensively the experiment was carried on.

The President—That is done, I believe. I do not know with what measure of success.

Mr. Witherby—The cast iron connection has been abandoned by all the companies that have tried it, and the proper bonding of the rails has been the most important thing tried to take care of it. The electric welding process has not been satisfactory on account of expansion, and the companies which are at all up-to-date are now universally using copper wire.

Mr. Stillson—I wish to give you what data I had obtained. The idea was to determine whether we were preventing the flow of electricity over the service. We used a standard short coupling with rubber gaskets on one section of the test; on the other, a special insulating coupling. There are really 3 conditions in the test: No. 1. No resistance as on plain pipe; 2, resistance of short coupling; 3, resistance of insulating coupling. The pipe itself has no resistance. The short couplings with rubber gaskets had .06 ohms resistance in the experiment which we made. The special insulated coupling, which was supposed to be an insulator, had 1.75 ohms resistance. In either one of these cases the amount of current that passed would be considerable, and would cause considerable damage. You can very easily get the drop of potential between your main and the rail, and, knowing the ohmic resistance, calculate the amount of current passing from the rail to the main, or vice versa. We attempted in the above experiment to get natural conditions, as the couplings tested were buried some 6 weeks or 2 months before being tested. Soil about test No. 2, gravel and loam; about test No. 3, gravel; points of contact in test being about 4 feet apart.

Mr. Williamson—I do not see any reason why the electric companies should not take care of their leakage. Most of the gas companies take the ground that the electric companies ought to take care of their leakage just the same as we take care of leakage on our mains. It does not make any difference whether they want to take care of it or not, or whether it is going to cause them expense. They can take care of it, and it does not make any difference what it costs. In fact they should be made to take care of it.

Mr. Andrews—The question was brought up a few moments ago as to whether the cast joint of street railway lines was effective. In the city of Duluth, where the temperature varies anywhere from 90° above to 40° below, that type of joint is used with perfect satisfaction. They have been used for the last 5 years. and we have no trouble from electrolysis so far as we can observe.

The President—The motion was that the report be accepted and the committee continued. All in favor of the motion as stated will signify by saying "Aye." Contrary minds, "No." It is carried.

Mr. D. McDonald—I wish to renew the motion which was ruled out of order a few moments ago, that it is the sense of the members of this Institute, based on experience, when the underground pipes become paths for the electric currents of street railways, the pipes will be damaged and in many cases destroyed, and there is no way of laying such pipes or protecting them by coating which will prevent such destruction. Now, gentlemen, I make this simply for the purpose of putting this Institute of men, who have an opportunity to know about this, on record as saying that, while they may to some extent obviate this difficulty, they cannot prevent it, and so far as we can determine this question the courts will be influenced very largely, I think, by the evidence of so many men who have had an opportunity to know just what the effect of electrolysis has been. I think we ought to go on record as expressing the opinion of the men who know, so that the burden may be placed on the men who have created the trouble. [Seconded.]

The President—Gentlemen, you hear the motion made by Mr. McDonald. I will not attempt to repeat it. Are there any further remarks?

Mr. Richards—I want to say that the street railway companies alone are responsible for the trouble. They are the ones that should be made to settle. They alone are responsible in every direction, and in every particular, for the harm, danger and expense to which the gas companies have been put. When we have a leak in a street main and an explosion occurs the gas company alone is responsible. Why should it not be the same way with the electric companies that allow this dangerous element to escape from the wires? There are means by which the current can be controlled, and we ought to go upon record unitedly in placing the blame where it belongs, and that is upon the trolley companies, not upon the gas companies.

The President—Any further remarks on this motion? All in favor of it will signify by saying "Aye." Contrary minds, "No." The motion is carried. The next is the

### Report of the Committee on Next Place of Meeting.

Mr. Witherby—Mr. President and Gentlemen of the Institute: Your Committee on Place of Next Meeting have found it an impossible task to suit every one. The last two meetings were held in Milwaukee and Chicago; naturally the East comes next. Now that we have grown to such a healthy, sturdy crowd, ordinary hotel accommodations are going to be taxed to find a place where we can all be taken care of in a fairly good way. After looking the situation over carefully your Committee decided unanimously in favor of Washington, D. C. [Applause.]

The President—Gentlemen, you have heard the report of the Committee on Place of Next Meeting. What is your pleasure?

Mr. Ramsdell moved its adoption. [Seconded.]

Mr. Egner—I am not interested to the extent of one cent whether the Institute comes to Norfolk next year or not, but I was commissioned by the Jamestown Exposition Commission, who, as you know, are going to hold a great exposition in Norfolk, Va., next year, to invite the Institute to come there. We have a very large building, expressly erected for just such occasions on the Exposition grounds. It has two very large halls, both of them larger than this room, and with any quantity of committee rooms—17 in all, I believe—and with all other usual accommodations. I was authorized to offer them all to the Institute free of cost. I do not believe you will come, but as your Committee did not see fit to make mention of this courteous invitation, gentlemen, I just wanted to tell you that you were heartily invited to do so. I think, however, this invitation should not have been by-passed without some acknowledgment. I will see you all at Washington, and I hope when you get as far as Washington that some of you will come down to Norfolk and see the great show, which in some ways will be the best that has ever happened in this country, especially from a military and naval point of view, as the greatest armies and navies of the world have promised to be represented upon this occasion. Norfolk is a small place compared with New York, Chicago or St. Louis, but I am sure you will not regret your visit to this fast becoming metropolis of the South. There are a great many points of interest to be seen, aside from the attractions of the Exposition, mainly in the historical line; for remember, gentlemen, Anglo Saxon civilization in America started at Jamestown, Va., which is the event we are about to celebrate at Norfolk next year. Next year England, Germany, France, Austria, Italy, Japan and other countries have all promised to send soldiers and warships there, and if you come you will see a great show, such—I believe it no exaggeration—as has never been equaled at any Exposition of modern times in this world. You will all be well taken care of. They are building hotels there now to beat all. They are building a great hotel on the grounds, to be known as the "Inside Inn," similar to the one at the St. Louis Fair two years ago. If you meet in Washington I shall have the pleasure of seeing you there, I hope, and let me say again that I hope as many of you as can will come over to Norfolk, which is not far from Washington after all, and when you get there just call on me and I will show you around.

The President—Any further debate? All in favor of adopting the report of the committee will signify by saying "Aye." Contrary minds, "No." It is carried.

Mr. Clark—Mr. President, has the time for the next meeting been fixed?

The President—I think it is fixed by the Constitution, as the third Wednesday in October. Is Mr. Learned in the room? If so, we will hear his paper.

Mr. Chas. A. Learned, of Meriden, Coun., then read the following paper on

## THE RELATION OF THE COMMERCIAL GAS MAN TO THE INDUSTRY.[1]

Mr. President and Members of the American Gas Institute: At the request of the Chairman of the Committee on Papers to be read at this meeting, the National Commercial Gas Association has prepared the following, entitled, "Relation of the Commercial Gas Man to the Industry;" it being a composite paper, written by three of its members representing the several elements of which the National Commercial Gas Association is composed.

*First Section*—By Mr. Charles A. Learned, Gas Engineer and Manager.

*Second Section*—By Mr. John C. D. Clark, Commercial Gas Man.

*Third Section*—By Mr. Richard H. Thomas, Manufacturer of Gas Appliances.

### Section the First.

The commercial man of the gas industry has taken such great strides to the fore in the last few years that he now stands forth a prominent factor in the promotion of gas output, and as such is entitled to, and should receive, some decided recognition from the industry.

In a brief way, I would like to outline what, in my estimation, are some of his just claims for consideration by the gas fraternity.

As a business builder, I believe, with many other gas men, that he

1. A composite paper presented by the National Commercial Gas Association for the American Gas Institute Convention.

has been largely instrumental in promoting gas sales along lines which, in the ordinary course of business, the gas engineer and gas manager would not have been likely to discover.

He has been the means of distributing gas through industrial appliances and various other channels which had not been exploited before his coming into the field. He has judiciously spent much time, money and energy in devising, promoting and marketing gas-using appliances for domestic aud industrial purposes, which up to his advent the gas producer perhaps never thought of.

He opened a new field in the matter of advertising, for gas men, who before his coming never thought of advertising their product, and advertising to-day enters largely into the promotion of the industry.

The large factor which this branch of the industry has become can only be realized by one who keeps continually in touch with this end of the business, and who watches the thousand and one ingenious methods employed.

If we are willing to concede that the commercial man has taken the initiative in this step toward giving the industry a new impetus, if he has been, as we must all admit he has, a valuable factor in helping to keep gas in active and successful competition with the electric light and others of its rivals, then the industry should make acknowledgment to him for his work by entering into hearty co-operation with him.

There are in my mind a number of ways in which we can work with the commercial gas man to our mutual benefit. For instance, many of the troubles of the maker, seller, buyer and user of gas appliances arise from the fact that these appliances are not standardized. Many misrepresentations are made either knowingly, or unknowingly, which bring about dissatisfaction to all and prove a positive detriment to the industry. The selling of gas appliances under such conditions can bring about but one result, the destroying of confidence and goodwill of the consumer or user, and the hampering of the gas output.

We are all familiar with the numerous complaints that come and the incident cost of remedying them where appliances of inferior construction are sold, and where the estimated cost of operating them is placed far too low, by reason of which we are swamped with high bill complaints, and the dissatisfied consumer does much toward killing the sale of other appliances.

Now the manufacturer and seller, as well as the buyer, should be set straight by some authorized body, who could intelligently gauge the worth of his appliances, tell him what would be considered standard and advise him from the technical viewpoint how best to attain this standard. This would be one step in acknowledgment of his worth as a factor in the industry.

Again, in the matter of exhibits. From the nature of his wares he cannot carry samples with him to show prospective buyers. The gas company man and the engineer are of course largely interested in seeing the newest and best types of appliances, and it would be greatly to their advantage if they could see the various ranges, water heaters, etc., in some exhibition hall, where at one time they could examine and compare their style, make up, etc., and advise with the maker and seller as to their efficiencies and the claims made for them. This holds good also in the matter of lighting devices, lamps for indoor and outdoor use, arc system lighting, etc., and such an exhibition would give the lamp man a chance to put his goods before his prospective buyers in an attractive and advantageous way. The engineer can hardly be expected to do anything toward getting appliances together or giving such an exhibition. That is the manufacturers or sellers work, but inasmuch as any advance made by the appliance man in the quality and efficiency of his output must be reflected in the gas sales, the commercial man should receive the earnest encouragement and hearty support of the gas maker in this kind of an undertaking.

In this day of specializing in order to keep to the front it is necessary to employ trained men in their particular lines. Take the line mentioned before; the advertising, for instance. This is an art in itself. The specialist in the advertising line knows what to advise in the using of mediums, how to build up attractive texts, cards, booklets, pictures, etc., and how to circulate them. A knowledge of this particular branch of the industry would hardly be within the province of the gas engineer to acquire.

The manufacture of appliances is a vast industry. Months of patient and persistent work are put upon designing, drawing, and pattern making, and other detail work, incidental to the making of an appliance ready for the market. Large sums of money are spent in producng appliances the sale of which for some unforeseen reason is difficult or unprofitable. Expensive and laborious work is carried on continuously, looking to the improvement of efficiencies, and modifications of forms to meet up-to-date ideas, all of which is important, not only to the advertiser but to the seller, buyer and user.

The interests of the gas appliance manufacturer are so closely allied and interwoven with those of the manufacturing gas man and the gas manager that they are practically one, with the manufacturer's position well to the fore. In the last few years he has made a place for himself as a promotor of gas sales which commands the attention of the entire gas fraternity, and the more marked his work becomes the more closely is the engineer tied down to his particular field of making and distributing gas.

The engineer's time must be so largely taken up with solving the problems of bettering his product and reducing his costs, having so active a competitor in the field as the electric man, that he is likely to keep too busy to attend much personally to the gas sales' proposition.

The manufacturer and his agents are in a position not only to help build up the gas sales, but they actually do a large amount of missionary work. They go about searching for new fields in which gas can be used as fuel. These in their own interests they bring to the notice of the gas men visited, and perhaps bring to their attention appliances of which the non-traveling gas man has been entirely uninformed.

The use of gas as a fuel is now in its infancy and, with the energy that is being put into it by the energetic manufacturer and commercial man, is bound to show wonderful results. There is one other important thing for the gas man to consider when sizing up the worth of the manufacturer and the commercial gas man to the industry, and that is, whereas the gas appliance manufacturer must be satisfied with his first and only profit, the appliance he puts into the gas man's hands will be a continual source of revenue and profit to the gas company.

The gas commercial man and gas appliance manufacturers have recently organized an association in which it is intended that all shall be active members.

Its object, like that of other associations, is the interchanging of ideas and promoting business along right commercial lines, and as naturally the manufacturer of gas appliances cannot enlarge his business without increasing the business of the gas man, it would seem to me that he is entitled to the gas man's most hearty support and co-operation.

### Section the Second.

It would seem to me that there is considerable room for a National Commercial Gas Association, or work by the Institute along the same lines. If the Association work is good for the engineering branch of our business, it seems to me that the commercial end should have an association also.

The very best thing that I have ever gotten out of association work has been the meeting of men from all parts of the country and obtaining from them their experience for the past year, the different plans they have tried and the results obtained therefrom. It is an old saying that the experience of others is the cheapest that one can get, inasmuch as it costs nothing, and may be the means of preventing one from wasting considerable money.

Gas companies are being forced to sell their product for less money than formerly, while engineering science has not developed ways to produce gas materially cheaper. It is, therefore, very essential that gas appliances should be brought up to high efficiency; that there should be practically no cost added to the appliances for maintenance. In operation they should be fool proof, and the operators of appliances should be thoroughly instructed so as to obtain the very best results and the highest fuel economy. In this way great numbers can be induced to use gas and to continue its use; therefore, a commercial body should be maintained in which we could confer with the manufacturers and obtain most efficient appliances. It is the proper step.

I think that the whole subject might be summed up under the head of "Appliances; their cost, their maintenance and the education of the users aud the gas company employees."

Under the head of appliances there is no question but that they should be standardized. If there were such a thing as a standard range it would enable each manufacturer to build in accordance therewith, and the efficiency of operation of each, such appliance would then have to come up to a certain mark before it would be considered "standard."

As to economy of construction, if these appliances were standardized it would be possible to use economy along all lines. For instance:

*Cost.*—The cost to manufacture appliances would be reduced; the cost to the gas company for maintenance and repairs would be reduced, as would also be the cost to the consumer.

*Maintenance.*—This is a point that many companies overlook when placing gas appliances on their lines. It looks to me as though, where companies are proposing to place or are placing large numbers of ap-

pliances on their lines, that the maintenance or future cost to them is the thing to be considered instead of the first cost. It is not a fair proposition to a customer to place in his hands a stove that is going to cost excessive money to maintain; neither is it fair for a manufacturer to sell either party an appliance that is going to be a source of expense for maintenance.

It is becoming quite general throughout the country for gas companies to clean and adjust gas ranges, and in some cases their maintenance service goes further and the different parts are supplied. Standardizing of the range would in such cases be an especial saving to the gas company.

*Education.*—Under this heading there is quite a field for good work to be done for the customers of the company. Gas company employees also need educating. There is no question that, if everybody were properly educated in the use of gas for fuel purposes, the business would make gigantic strides at once.

How many cases does one find where the gas company has placed appliances in a customer's premises that, had the salesman and customer both been educated in the use of gas for fuel, they would have installed an entirely different set of appliances.

To me the whole thing sums up about as follows: If association work is good for the engineering branch of the gas business (as I believe it has been acknowledged that it is) there is no question but that it would be the best step that was ever taken to have the commercial men form an association, or have the work carried on through other channels.

Gas companies are continually spending money for working improvements, main renewals, service repairs, laying larger mains, etc., all of which must come to nought unless there is a corresponding output or sale of gas. It is acknowledged by all that if the people knew as much about gas as some of the gas men do, they would all *use* it for all domestic and largely for industrial purposes. The expense at all times is largely regulated by the class of appliances. It is, therefore, time that gas companies should see that their customers are not being continually fooled by fakirs, and that all appliances placed on the market should bring out the very best there is in their gas, and that the appliances should not be a source of endless expense to the consumer and to the gas company.

This perhaps can be best attained by bringing the gas man and the appliance manufacturer into the closest posible touch for consultation, and upon the convention floor as enjoying equal privileges in discussion, etc. The best makers of appliances could and would then join heart and soul with the gas man to stamp out the fakir and his wares.

In conclusion, I would say that the work of the commercial association should commence where the work of the past association stopped, and that it should be our business to keep in touch with the manufacturers of appliances; thus to see that they turn out the proper sort of appliances at the proper time, make necessary improvements and alterations as needed, educate selling organizations to a knowledge of the business, and educate the consumer so that he can obtain the very best results.

### Section the Third.

The true strength of a manufacturing concern lies quite as much in the loyalty and helpful encouragement of its customers as in its experience and the size of its bank account. No industry has succeeded that did not build upon "co-operation" as one of the foundation stones, and the progressive man is bound to be a firm believer in its power. In an association, co-operation of the members is necessary to secure the best results. In a manufacturing industry, team work among the employees, all pulling for a common end, is vital to its success.

Going beyond the factory, co-operation of customer with manufacturers means much to the latter. A manufacturer's customers are an invaluable asset from the standpoint of information alone. Using the ideas of both parties—namely, the man who sells and the man who manufactures—means the production of a piece of goods that will stand the test of criticism from all quarters, and co-operation is the force which makes the results possible.

In the gas industry co-operation has reached an especially high plane in the formation of the American Gas Institute. Each of the organizations forming the new body had been doing effective work in its particular field, but progressive members believed better and more lasting results would follow consolidation, and the new organization stands as a powerful illustration of the fact that co-operation spells success.

In what relation does the appliance manufacturer stand to the new body as it represents this gas body? Except socially he is barred from sharing in the benefits of the magnificent organization, because topics affecting the commercial end of the business (and these are the only ones in which he is particularly interested) are rarely discussed, unless the order of business in the new body differs radically from that of, for illustration, the American Gas Association, and because he can have no voice in asking questions or entering into discussions for the purpose of bringing out points of value (when understood) alike to the gas man and appliance maker.

The maximum good in association membership to the manufacturer can only be secured when, as a member, First: He stands on an equal footing with the other members. Second: When he can meet them in debate on the floor of the convention. Third: When, by being an active member, he has all privileges of the organization, and in consequence has a strong incentive in working for its up building. Fourth: When he knows that papers or talks bearing on the production and sale of gas appliances will occupy all of the time except that required for business.

The National Commercial Gas Association opened to the manufacturer a new and valuable channel for information to reach him. If this means is continued in much the same way it will unquestionably prove of incalculable benefit to him. Its value lies in the fact that it concerns itself exclusively with matters affecting the commercial end of the gas industry. The plan gives to the manufacturer an opportunity of meeting those men in the industry who buy of him or whom he hopes to persuade to buy of him, and to discuss with them on the floor of the convention ways and means for improvements, new appliances of various kinds, and other items that are to the interest and concern of both parties.

Collectively, as an association of commercial men and gas appliance manufacturers, they co-operate to better conditions, and experience has proven that the closer the manufacturer can get to his customer, and vice versa, the better are the results. One of the objects of the National Commercial Gas Association that appealed to me (it may be found in its Constitution) is as follows: "The encouragement of manufacturers to produce high grade and highly efficient devices that require gas for light, heat and power."

Such a form of organization in our judgment is precisely what the gas appliance manufacturer has been looking for for years. It is simply a body of men banded together, pledged to encourage and help him in the production of his goods and he, in turn, stands pledged to the other members to devise ways and means for improving present appliances by producing appliances of a higher grade, equipped with highly effective devices that shall burn gas as a fuel.

In this organization, as you probably know, the Commercial Association to which I have referred, the manufacturer stands on a par with every other man connected with the body; and he receives the maximum amount of benefit from it, because he is admitted to participation in its affairs as an active member. The meeting with active members of a gas association in a social way, and the manufacturer has heretofore been unable to go farther than this, is certainly extremely pleasant, but the results are in no wise as beneficial to either party as discussion of topics on the convention floor, in which both the gas man and gas appliance manufacturer take part. The gas man sells the appliance to the consumer, knows his own needs and can suggest same to manufacturers of appliances at the convention, where all may hear and take active part in debating the question.

If the American Gas Institute proposes to devote a day or two of its convention to a discussion of matters concerning the commercial end of the industry, there is perhaps no need for an independent organization; but believing that the marketing of a product is equally as essential to the success of an industry as the production of the same, it appears to me that greater recognition is due the commercial topics than has heretofore been given them.

If the American Gas Institute is to devote the time of the convention, or the largest share of it to a discussion of engineering topics, and treats only superficially those concerning strictly the commercial end, and furthermore, does not admit the manufacturer to active membership, then there is certainly room for a body like the National Commercial Gas Association, and such an organization is bound to receive the hearty support of every manufacturer of gas appliances, and at least, in time, the same support by gas managers, because both are vitally concerned in the outcome of any and all discussions that may take place at its meeting.

### *Discussion.*

The President—Gentlemen, this paper is before you for discussion.

Mr. Searle—It seems to me some very good points were brought out by this paper. On page 7 I notice the phrase, "Educate selling organizations to a knowledge of the business." To show the necessity of educating the selling organizations, I had a salesman of one of the large water heater manufacturers arrange to meet a lot of our employ-

ees. Before he did so I told him I wanted him to come to my room and tell me about it before he talked to them. He did so, and I asked him to explain the workings of it to me. He started in by saying, "We will assume that the water is going into this heater at 30°." I said, "We will not assume anything of the kind," and I had to stop and educate that man before he started. Now that man sells heaters direct to the consumers and with good results, so it looks as if we could afford to give some of our time to educating the selling force.

A Member—How did you educate him?

Mr. Searle—Well, I educated him all right. (Laughter.) I started in on the line that we did not get more heat from a blue flame than from a yellow flame if combustion was complete in each case, and I tried to impress it upon him that he should thoroughly understand what actually took place in the heater before he went before them, and that water at 30° was ice. I took a couple of gas engineer's text books and spent about an hour or more with him to get him started right. I cannot state exactly what I said, but he certainly needed a lot of education.

A Member—It seems to me the time is coming when the biggest thing we will have on our hands in some places will be to meet competition from electric appliances. I think on that ground we ought to form a good relationship between the manufacturers of appliances and our sales' departments, and adopt the best business methods for placing the appliances using gas before the public, and then work on the line of making them cheaply and making a lot of them. We ought to be able to sell them. That seems the wisest feature of the business to me. We can work on the manufacturer for some time, but must establish better relations, and we need a good deal of assistance to learn how to sell the appliances, especially when we are meeting with a 5-cent per kilowatt hour rate in the electric light line.

Mr. W. H. Gardiner, Jr.—The gas business to-day seems to have entirely outgrown the idea that we have got any monopoly. The whole thing is based upon the footing purely of a commercial undertaking supplying artificial light, heat and power, and in that we have many competitors. Now the business, it seems to me, is divided into three big groups—the physical department, the commercial department and the financial or corporation department. I think the commercial department is a very important one. When we take it in any other form of manufacturing, what is it that worries the manufacturer? Is it his means of making his goods or is it his means of disposing of the goods after he makes them? To my mind it is the latter. That is really the important thing on which he spends his best ability at times, and he uses every effort to organize his selling force to be effective, and finds markets to absorb his product. I think, therefore, we should give the closest attention to this question of commercial activity in the gas business. It is the one means, as it seems to me, whereby the gas business can retain that position in supplying the demand of communities for artificial lighting, heat and power, to which it is entitled.

Mr. Clabaugh—It seems to me this is one of the most important papers read at the meeting, for the reason that the American Gas Institute has now had the way pointed out by which it can co-operate with the commercial organization and take up this question with the manufacturers of these appliances. Here is an organization which has been formed that can do this work, and can co-operate with the American Gas Institute as well, if not better than any other. This organization is formed for the purpose of advancing the gas interests, and is formed to co-operate with the gas industry, and assist in its development in every way possible. In days gone by the engineering department did not think the commercial department of the industry worthy of consideration. The engineering department would be of very little value if the commercial department did not sell the product; it is the commercial department that comes in contact with the consumer for the benefit of all connected with the industry. It is through that department that the sales are made, and by the co-operation of the engineering and commercial departments you then have what every business should have, a complete and satisfactory working plant. Therefore, I say the Institute should co-operate with this commercial organization in every way it possibly can, and encourage it to go on with the work which it has begun in order that the commercial association manufacturers and commercial men may come together. The manufacturer has his place upon the floor, and the place of the commercial man is at his right hand. There should be better co-operation between the two branches of the industry. The commercial branch can certainly evolve some ideas and bring someting to the engineering branch that will be of benefit to the engineering industry, and certainly better feeling and results can be attained. [Applause.]

The President—I think, Mr. Clabaugh, it is the intention to have this co-operation take place in the new order of things, and that is why this paper has been secured from the National Commercial Gas Men's Association. Is there anything further?

Mr. Persons—I move a vote of thanks be passed to Mr. Learned and to the Commercial Gas Association for this paper which has just been read. [Seconded and carried.]

The President—Now, Mr. Forstall, you had something to bring to the attention of the Institute.

A Communication from Mr. Walton Forstall.

Mr. W. Forstall—At the 1905 meeting of the American Gas Light Association a new standard for cast iron pipe and special castings was adopted, and in the proceedings of the meeting were published a set of 34 plates containing the leading dimension and the weights of all the castings embraced by the standard. The design, and, therefore, the leading dimensions of the castings, had been carefully considered and represented the ideas of many large users. The minor dimensions and the weights were worked out by people whom it was reasonable to suppose could be depended on for accurate work. Unfortunately, there was not much time available for the work, and soon after the adoption of the standard it became apparent that many errors in calculation had been made, and that, although these errors did not affect leading dimensions at all, nor even weights to any appreciable extent, yet before working drawings could be made from the data adopted, a thorough revision of all previous calculations would be necessary. This revision has been made and a revised set of plates has been prepared, which, to all intents and purposes, are identical with those adopted by the American Gas Light Association. As the standard was hurriedly adopted by the Association, due to the lack of time for discussion, it is recommended that criticisms from members of the Institute be asked, blue prints being sent to all members desiring them; these criticisms to be sent to whatever committee may be appointed for the consideration of such matters, and that such committee present the plates revised as they may deem advisable, to the next meeting of the Institute for adoption as its standard. It is desired to bear testimony here to the work of Mr. James G. Davis, of the Philadelphia gas works, for the time and care he has given to the task of revision. I move that the incoming President appoint a committee to receive any criticisms which may be sent in of the revised standard for cast iron pipe, the idea being that this committee will present to the American Gas Institute at its next meeting such a standard as the Institute will adopt. [Seconded.]

The President—Gentlemen, you have heard the motion. Are there any remarks? If not, all in favor of the motion will please express it by saying "Aye." Contrary minds, "No." The motion is carried.

Mr. A. S. Miller—Will that committee send out to the members of the Institute this proposed standard in advance? At the last meeting of the American Gas Light Association this was put through in a very hurried way and without the members having much chance to see it.

The President—I presume that will be done.

Mr. W. Forstall—I would just like to say that it does not seem advisable to send out to all of the members of the Institute the 34 plates containing the dimensions, etc., but the idea was that any member who was interested in it, upon making application, could get a set of the blue prints at any time after the first of next month. The idea is that any man who wants to criticize will have the opportunity to get the blue prints, and then the criticism will be considered by the committee.

The President—Is Mr. Olds in the room? If not, I will ask the Secretary to read his report respecting the Information Bureau.

Mr. Olds not being present, the Secretary read the following

## REPORT OF THE BUREAU OF INFORMATION OF THE OHIO GAS LIGHT ASSOCIATION TO THE AMERICAN GAS INSTITUTE.

Since the last meeting of the Ohio Gas Light Association, in March of this year, when it was voted to amalgamate with the American and Western Associations to form the American Gas Institute, there have been but few inquiries made of the Bureau of Information. I attribute this largely to the diversion of attention attendant upon the change being inaugurated. In the two previous years of its existence the interest was marked and the Bureau answered a very considerable number of questions.

The nature of the inquiries that have been answered indicate that this department might be made to fill a most useful purpose and that it would occupy a distinct field, not encroaching upon nor conflicting with that of any other department. Its usefulness, particularly to the smaller companies, may be made very great. It has the advantage over the Question Box in that it is always ready to receive and refer

questions for immediate answer, and through that fact can deal with inquiries that cannot await the annual meetings.

I would recommend that the Bureau be continued by the Institute and organized with a chairman and five committee members representing manufacture, residuals, distribution, high pressure supply and mercantile or sales' departments. All inquiries to be addressed to the chairman, and the questions involved to be by him allotted to the proper committee member. The latter to refer them to such members as he may believe able to assist to compile the replies and submit them to the chairman for answer to the questioner. At each annual meeting the chairman to submit a report embodying such of the questions as might prove of general interest, and the replies of the Bureau thereon. Under such organization the only person aware of the identity of the questioner would be the Chairman of the Bureau Committee. The questions asked would be of an immediately practical character, and, together with a discussion of the annual report, should record the best thought existent on any given problem or method.

Respectfully, H. L. Olds, Chairman.

On motion of Mr. Ramsdell the report was ordered received and spread upon the minutes.

A Partial Report.

Mr. T. D. Miller—The committee that was appointed at the Western meeting last spring, in regard to working out a definite and suitable formula which would express in a single statement the value of the gas with reference to its calorific value and candle power, has done some work since that May meeting, but it has not been able to arrive at any definite conclusion. Differences of opinion exist throughout the committee, and we have concluded that they are due entirely to the fact that our data is not extensive enough as yet to enable us to get down to a basis. Therefore, this report is submitted more in the nature of a report of progress. It is for the members of the Institute to say whether they want that committee as a committee on this subject continued. The work is going on anyhow. If it is continued in the name of the Institute the committee is going to ask for information so that we can get a lot of data together from all over the country relative to all kinds of oil and all kinds of fuel as a basis on which to complete the formula, if possible.

The President—I think it would be a good thing to continue the committee.

On motion of Mr. Summers the report was received and the committee continued.

The President—Gentlemen, that completes the programme. If there is anything you have to offer we will be glad to hear it at this time.

Adjourned.

A Member—Do I understand that if we adjourn now, the programme having been completed, that we are to have no session to-morrow? Is this a final adjournment?

The President—I think the final adjournment should be held up until to-morrow to see if anything turns up.

On motion of Mr. Miller the meeting was adjourned.

Third Day.

On Friday, October 19th, no session of the Institute was held, and the prior adjournment became the final one.

## Report of Committee on Electrolysis, Prepared for the American Gas Light Association, and Submitted to the American Gas Institute on Behalf of the Former as a Contribution to the Proceedings of the Latter.[1]

To the President, Officers and Members of the American Gas Light Association—Sirs: Your Committee on Electrolysis begs leave to submit the following Report:

Introduction.

Mr. Beal's Presidential Address, at the Annual Meeting of this Association in 1902, contained the following recommendation:

"I should like to see a Committee appointed which would make a careful investigation of this whole problem [of electrolysis] and render a report in such form that it could be used by managers in framing arguments for presentation before the local authorities."

This recommendation of Mr. Beal led to the appointment of a committee which is now constituted as follows:

Arthur H. Hall, of New York; S. P. Curtis, of Philadelphia; John Williamson, of Chicago, and A. G. Glasgow, of London, England, Chairman. Your committee has been fortunate enough to secure the co-operation of Albert F. Ganz, M.E, Prof. of Electrical Engineering, Stevens Institute of Technology.

The geographical distribution of the members of your committee, which has made their close collaboration impracticable, was doubtless intended to insure that their work should cover a wide range of territory; and this report has been framed in the endeavor to meet your reasonable expectations in this respect. It consists of 5 sections, namely:

I.—Theory of electrolytic corrosion.
II.—Electrolysis in America.
III.—Electrolysis in Great Britain.
IV.—Electrolysis in Germany.
V.—Summary and conclusions.

Your committee advances no new theories and can suggest no new remedies. It avoids controversial treatment, and deals solely with the indisputable facts that have been developed by experience. To this end, the committee's endeavor has been to establish authoritatively the universal state of the art of electric traction with reference to electrolysis. When this is accomplished, the logical conclusion becomes self-evident, and is the same in all countries.

SECTION I.—THEORY OF ELECTROLYTIC CORROSION.—By Prof. Ganz.

Electric conductors are divided into two classes, namely:

1. *Metallic conductors*, which transmit electric currents without chemical decomposition; and,

2. *Electrolytic conductors, or electrolytes*, which transmit electric currents by a corresponding transfer of *ions* in a solution, thus producing chemical decomposition at the electrodes.

The metals are the most common *metallic conductors*. Chemical compounds in solution, which can be decomposed by an electric current, are *electrolytic conductors* or *electrolytes*.

Pure water has such a high resistances that it may practically be considered a non-conductor. Water is made conducting by the addition of salts or acids in solution, and conduction through water is, therefore, always *electrolytic*. For the present purposes we need only consider the electrolytes consisting of salts dissolved in water. The conducting terminals by which the current is led into and out of an electrolyte are called *electrodes*. The electrode by which the current enters is the *anode*, and the one by which the current leaves is the *cathode*. The following brief explanation of *electrolytic conduction* is in accordance with the modern theory of *electrolytic dissociation*:

When a salt is dissolved in water, some of the molecules separate or dissociate into two parts, one part having a positive electrical charge, and the other a negative electrical charge, and these parts are called *ions*. The metal part or the hydrogen is the positive *ion*, and the acid part is the negative *ion*. For instance, copper sulphate, $CuSo_4$, when dissolved in water, dissociates into the positive *metal ion Cu*, and the negative *acid ion* $SO_4$.

An electric current is transmitted through an electrolyte by the motion of these ions. The metal or hydrogen (positive) ions travel in the direction of the current and carry positive electrical charges to the cathode, and those metal ions, called *cations*, are deposited upon or are liberated at the cathode. The acid (negative) ions travel against the current and carry negative charges to the anode, and these acid ions, called *anions*, will corrode the anode if it is a metal which combines chemically with these anions. The cathode is never corroded.

For instance, if the electrolyte is common salt dissolved in water, the anions are chlorine, and an iron anode would be corroded, the iron forming ferrous chloride; the cations are sodium, and these would decompose the water and liberate hydrogen at the cathode. With an electrolyte of copper sulphate dissolved in water, and a copper anode, the latter corrodes into copper sulphate and dissolves while metallic copper is deposited upon the cathode. These examples furnish an illustration of the fact that the corrosive action of the current results in supplying the electroyte with an equivalent to the amount of salt decomposed by the current, so that the electrolyte is continually replenished with salt and its electrolytic conducting power is thereby maintained. This salt will contain the metal ions of the anode, or hydrogen, and may be different from the original salt which started the action.

The rate at which the *ions* are liberated at the electrodes is proportional to the current strength. With an oxidizing anode, the mass of anode corroded by one ampere in one second, is equal to the *electrochemical equivalent* of the metal of the anode. This is 0.00029 gramme for iron (ferrous). From this the mass of iron corroded by one ampere in 1 year is, $0.00029 \times 60 \times 60 \times 24 \times 365$ grammes, or, $0.00029 \times 60 \times 60 \times 24 \times 365 \times 0.002205 = 20$ pounds (approximately). The elec-

1. This report is limited to the consideration of direct current electricity, and is, therefore, contingent upon future developments in the use of alternating current electricity for traction purposes.

tro-chemical equivalent for lead is 0.0010718, and the mass of lead corroded by one ampere-year is, 0.0010718 × 60 × 60 × 24 × 365 × .002205 = 74 pounds (approximately).

The separating of the metal or hydrogen *ion* from the electrolyte at the cathode absorbs energy from the electric circuit and generally produces an electromotive force in the opposite direction to the current. The oxidation of the anode supplies energy to the circuit and generally produces an e.m.f. in the direction of the current. If an oxidizing anode is of the same metal as is being deposited upon the cathode, and the electrolyte is the same at the anode and cathode, there is no resultant e.m.f. due to the electro chemical actions, and the only e.m.f. consumed is that due to the resistance of the electrolyte in accordance with Ohm's law, exactly as with a metallic conductor.

If the metal deposited at the cathode is different from that oxidized at the anode, or if hydrogen is liberated at the cathode, or if the electrolyte at the cathode is not of the same composition or density as at the anode, there will be a resultant e.m.f. which may be either in the same direction as the current or in the opposite direction to the current.

Street soils generally contain salts, principally chlorides, nitrates and sulphates, dissolved in water, and this makes them *electrolytic conductors*. It has been claimed by some that soils conduct to a considerable extent metallically; this has, however, been disproved, and it is now understood that soils can only conduct electrolytically. The conductivity depends then entirely upon the chemical composition and wetness of the soil, which vary greatly in different localities.

In practically all single trolley roads the trolley wire is connected to the positive pole of the dynamo, and the rails are connected to the negative pole. In cheaply constructed roads the connection to the rails is only made at the power station, and the rails are, therefore, expected to serve as the return conductor for all current. In order to make the rails a continuous conductor they are bonded at their joints, ordinarily with copper wire.

We will now consider the result of this construction. The rails are in contact with the ground for their entire length, and as the street soil is a conductor, part of the return current must shunt through the ground in accordance with the law of divided circuits. This current, which, as it were, leaks from the rails through the ground, is called stray current. In the simple case under consideration (rails connected to the negative pole at station only) the potential of the rails increases with the distance from the station and with the number of cars in operation. Neglecting any slight counter electromotive force, the amount of stray current varies directly with the potential difference in the rails, and inversely with the resistance between the point at which the stray current leaves the rails and the point at which it again enters the return conductor. The stray currents would disappear then, either with zero potential difference in the rails, or, with an infinite resistance to their path, two conditions which are clearly impossible with a single trolley electric road, and, therefore, stray currents are always produced by such roads. In some electric railway stations the negative busbar is grounded by means of earth plates. Since this diminishes the resistance to the ground, the result of this practice is to increase the stray currents.

If the ground through which the stray currents pass contains metals, such as water pipes and gas pipes, which have a high conductivity, these currents will largely pass through such metals. In general, in districts distant from the power house the stray currents flow through the intervening soil from the rails to the pipes; these districts are, therefore, called *negative* districts and the pipes in them *negative* pipes. In the district surrounding the power house the stray currents flow from the pipes through the intervening soil to the rails; these latter districts are, therefore, called *positive* districts and the pipes in them *positive* pipes. Between these two districts the stray current flows from rails to pipes or from pipes to rails, depending upon the distribution of cars, etc. These intermediate districts are sometimes called *neutral* districts.

Since every electric circuit must be completely closed, all current which leaves the plus terminal of the dynamo must return to the negative terminal. For this reason all current which escapes from the rails in the negative district and reaches the pipes must again leave the pipes in the positive district in order to return to the negative pole of the dynamo. The electric current is in this respect very different from gas or water, which latter can leak from a pipe and become diffused through the ground.

With the stray currents in the ground and on the pipes we have then the conditions of an electrolytic cell, the pipes and rails being the electrodes, and the dissolved salts in the soil the electrolyte. In the negative district the current flows from the rails through the soil to the pipes, and the rails (anodes) are corroded while the pipes (cathodes) are not corroded. The corrosion of the rails does not concern the pipe owning companies, and they have considered these negative districts as *safe* districts. In the positive district the current flows from the pipes to the soil and the pipes (anodes) are corroded by the current. For this reason the positive district has been called the *danger* district.

The reason for connecting the *negative* rather than the positive pole to the rails was to concentrate the positive district within the region surrounding the power house; it was hoped in this way to restrict the pipes endangered by electrolysis to this definite and comparatively small region, so that they could be watched and remedies applied. It has been found, however, that there are many points in the negative and intermediate districts, for instance at joints, where current may leave a pipe and produce electrolysis.

In most large, single-trolley systems the rails are connected to the negative busbars by return feeders at a number of places besides directly at the power station. At each point of connection of such a return feeder to the rails a positive region is established, and some stray currents will leave the pipes in this region to return to the rails near such points.

The danger region of a piping system is in fact by no means confined to the so-called positive districts, but at every point where current leaves a pipe to pass into wet soil, electrolytic corrosion must take place. An iron pipe is ordinarily not in uniform contact with the surrounding soil, owing to high resistance oxide coating, etc., so that the current leaves in spots where there is good contact with the soil. The result of this is that the corrosive action is concentrated at these spots so that holes or *pittings* are produced by the corrosion.

It has been stated that one ampere-year will corrode 20 pounds of iron or 74 pounds of lead. Secondary chemical reactions may, however, greatly increase this amount of corrosion. It must also be understood that this 20 or 74 pounds of corrosion occurs at every point at which the current leaves the pipe for wet ground, and that the same ampere of stray current can leave and again return to a pipe any number of times in its path, depending upon the electrical conditions; so that any number of times 20 or 74 pounds of corrosion may be produced by a single ampere of stray current in 1 year.

It has been shown that a small fraction of a volt (Jackson says "a mere directive force, in the nature of a pressure") will produce enough current to cause electrolysis with the conditions generally present with underground pipes. This has been proven experimentally by a number of investigators, notably by Jackson,[1] Fleming[2] and Larson[3].

The published results of some laboratory tests with alternating currents seem to indicate that these may also produce electrolysis, the extent of which is probably a small fraction of that produced by an equal direct current. Alternating currents would, however, corrode both electrodes. Electric trolley roads have only very recently begun to use alternating currents, and so far no practical experience has been furnished from which it can be concluded whether electrolytic corrosion is practically negligible or not. It is, therefore, not safe to assume, as some writers have done, that the substitution of alternating for direct currents on single trolley roads would eliminate electrolytic troubles.

It is clear from the foregoing that the electrolytic corrosion is produced where the current passes from a pipe to wet soil, and that the amount of corrosion depends upon the strength of the current and the time during which it acts. The fact that a pipe is positive to some other conductor is not in itself evidence that electrolysis is taking place; there must in addition be an electrolytic conductor, in the nature of wet soil, between the pipe and the negative conductor so that the potential difference can cause a current to flow from the pipe to the soil. The smallest quantity of a soluble salt in this soil is sufficient to start the corrosion, and this action of itself replenishes salt required for electrolytic conduction as shown before. A high potential difference may, even under certain conditions, indicate a high resistance and a correspondingly small current with little corrosion, while a low potential difference may indicate a low resistance, and a large current with a correspondingly large amount of corrosion. Electrolytic surveys which consist only of voltmeter readings are, therefore, not sufficient to determine the existence and extent of electrolytic corrosion. Direction and strength of current flow in various parts of the system are required in addition to the voltage readings.

1. "Corrosion of Iron Pipes," by Prof D. C. Jackson, "Journal of the Association of Engineering Societies," September, 1894.

2. "The Electrolytic Corrosion of Water and Gas Pipes by the Return Currents of Electric Tramways," by Dr. J. A. Fleming. "The Electrician," London, Sept. 16, 1898.

3. "Electrolytic Action of Electric Currentt Upon Iron Pipes in the Ground and the Resulting Polarization," by Prof. A. Larson, American Water Works Association Proceedings for 1903.

(To be Continued.)

[Prepared for the JOURNAL, by "R."]

## Gas Engine Flywheel Explosions.

We hear of an occasional explosion of the flywheel of a gas engine, some reasons for which are enumerated in this article, after careful investigations of exploded wheels and causes thereof. Gas engine flywheels, or balance wheels as some call them, may be divided, like all other balance wheels, in divisions. Two classes of gas engine flywheels may be made, and these can be adjusted in their proper classes from the fact that one kind runs with a belt on the rim while the other kind is free of a belt. The employment of the belt on the gas engine flywheel is very common, as all know. It is a very tempting thing to utilize the smooth surface of the balance wheel for carrying a belt, instead of going to the expense and labor of keying or set-screwing another wheel on the same shaft for this purpose. Hence many of the flywheels of gas engines carry belts as well as do the balancing of the engine. The wheel, whether carrying a belt or not, is calculated to prevent sudden fluctuations in speed due to the variations in power consumed as machinery is put on and off the power system.

Primarily, however, the flywheel, as a flywheel alone, is intended as a balance wheel only. As a belt wheel, it not only must balance the power but carry the belt; and some of the wheels are operated at considerable speed. There are two types of the wheel, each calculated to fit into the conditions of the belt or non-belt wheel; but circumstances of power and machinery often mix the two, and we find that the thin-rimmed wheel, intended for carrying a belt, is used without a belt.

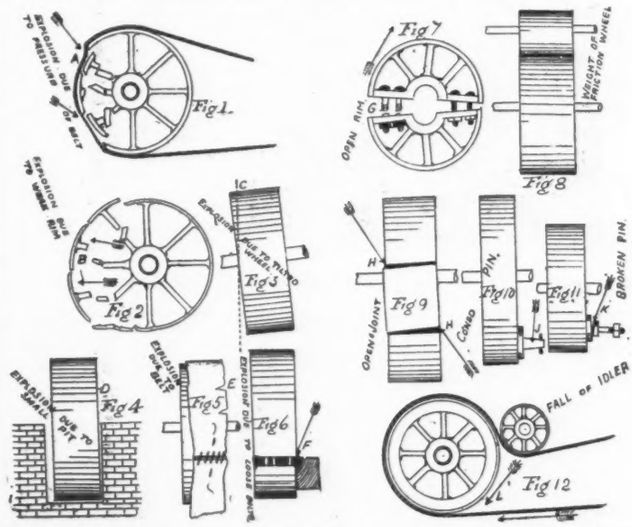
On the other hand the thick rimmed wheel, which was intended to run as a balance wheel only, is now and then observed with a belt on it. It is not remarkable that there are occasional explosions of flywheels. Some of them are quite disastrous. I have seen instances in which parts of the exploded wheel were sent crushing through masonry walls. Not long since I saw a case in which a heavy belt, which was compelled to carry considerable shafting in running a plant, crushed through the side of the wheel, as at *A*, Fig. 1. It was found that the engine was often overloaded. One day when the overload was unusually heavy the crushing strain of the belt broke in on the rim as demonstrated.

In another case the clogging of the machinery in a mill caused the effect produced in Fig. 2, because the rim of the wheel was thin and weak. The gas engine was driving at high speed. Suddenly one of the cogs in a central clutch transmission, connecting 2 shafts running at an angle, rode one another. This checked up the speed so suddenly that the weak rim of the flywheel of the engine was thrown out by the centrifugal force, breaking it into pieces as shown at *B*, ruining the wheel and endangering the people in the vicinity from flying pieces of metal.

Then, in another instance, the flywheel explosion was due to the wheel shaft getting tilted out of line, as in Fig. 3. The straight line *C* marks the perpendicular position. The tilting is shown in enlarged form, so as to bring out the idea more plainly. Tilting wheels are dangerous to run. You never know what they are going to do. Sometimes they wabble badly, and again they come into contact with the sides of the pit and explode, as illustrated in connection with the wheel shown in Fig. 4. In this instance the wheel shifted on the shaft and contacted with the edge of the stone pit. The side *D* struck with a bang finally, and the cast iron rim was shattered and the wheel exploded. In another instance the explosion of the wheel was placed to the cause of the rickety edged belt, as shown in Fig. 5, at *E*. The belt with its even edges is pretty sure to run along the rim of the flywheel in a steady manner, but as soon as the edges get into the order herewith exhibited, it is time to look out. In this case the belt ran off and wound on the shaft, making the engine stop so suddenly that a section of the flywheel was thrown out. In another case the flywheel was broken by one of the sections of the wheel working loose and catching on the corner of a wood beam. This is shown at *F*, Fig. 6. It is a good plan to watch the bolting of united wheel flanges and tighten up the bolts as soon as discovered loose. Then we hear of a case in which an explosion resulted from the opening of a divided wheel. There are a few of this sort of split wheel in use. The sides are held together by means of fastening bolts. These bolts rust to some extent and become weakened. Therefore, when the governor belt broke on the engine one day and the engine raced, the weak bolts opened and the flanges were divided, as shown.

In one instance which I saw, the weight of the secondary friction wheel caused the rim of the larger wheel to crush in on a day when the load suddenly went off, caused by the main belt breaking. Open joints are the direct cause of the exploding of many wheels. Fig. 9 illustrates how one wheel was put out of commission. The joints were not so badly disordered, as shown in this drawing, but were not far from it, being opened enough to permit the edges of the metal to contact with the surrounding parts, and the corners *HH* created damage by catching and breaking off the wheel rim. Sometimes a wheel will break when the piston rod connection goes off. I recollect a case in which the wheel pin for the rod was made on the coned plan, as in Fig. 10, at *J*. The secondary pin slipped out and this let the bearing of the rod slip off. The sudden jolt imparted to the wheel caused it to explode. There have been cases in which equal results have followed the breaking of the pin, as shown at *K*, Fig. 11. The excessive strain on the pin caused it to snap off. This freed the entire connection and let the wheel practically loose. The rim of the wheel was not over-strong, and in quick order the metal sprung out of line and fractured.

In Fig. 12 is exhibited a somewhat odd accident of this nature. An




idler which was used to guide the belt in the manner shown broke from its position when the belt was in motion and dropped down to the point *I*, indicated by the arrow. The force of the belt caused the little wheel to get tangled up. The belt was overstrained and broke, producing a break in the parts of the wheel, and, cracking the thick rim of the main wheel, produced a weakness which finally made the large wheel explode. Of course there are occasions when defects in the design of the wheel, or in the adjustment of the journals, or the alignment of the shafting, will cause explosions of the wheel; but in very many instances, the explosion of the wheel is due to some neglect at the works. The builder of gas engines takes every precaution to avoid danger of a balance wheel explosion. He builds his wheels strong and adjusts them according to modern principles of high speeded engine flywheels.

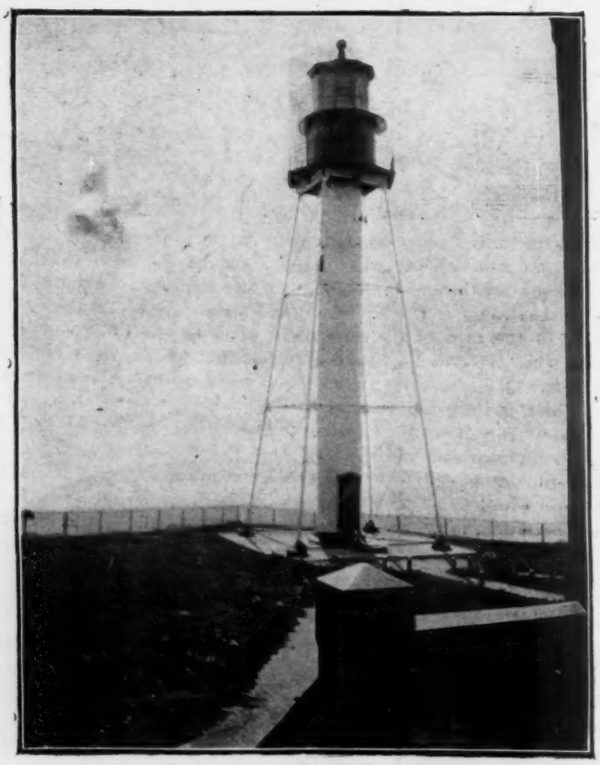
[Communicated by "F. J. K."]

## The Highest Light and the Last in America.

It is a strange coincidence that the most southwesterly light in the United States to day is also within a few dozen rods of the tallest lighthouse in the country. Both are out on Point Loma beyond San Diego, Cal., and visitors to international headquarters of the Theosophical Society make a point of driving on to the former of these for the pretty picture of sea and wave and lighthouse it affords. *En route*, on the very top of a ridge, extending along the left, the tallest lighthouse looms up, deserted now and lone. This in its time was the highest in the country, standing 422 feet over the sea; but being thus above the fog it was useless and abandoned, so that for some 12 years the other light, the last on our southwest coast, has been in commission. This structure rises up, a mass of openwork, white painted, right by the sea, with the two keepers' homes, two-story, white-walled, red-roofed frames, beside it, and just beyond a wild gulch of the sea where the seals disport in a cave up above the ocean. The tall lighthouse then looms up, its shutters yellow against the white, and in far background the Coronado Islands rise from the sea.

Usually the visitors take dinner here, robbers though these lighthouse keepers are known to be. On alternate days each sets the lunch, and they charge just what they wish. Usually in fact tourists bring their own lunch, setting it out on the table of the dining room, and not infrequently inviting the lightkeeper to partake. Then he offers bread,

Southwesternmost Light in the United States.



The Point Loma Light

bologna and coffee, and of the latter alone does one partake. For, when reckoning time comes he charges 70 cents, just for yourself and driver.

Meantime though, he further entertains you by recalling the days when he served under Farragut. Then he draws attention to the bunch of callas and yellow daisies on the long table, nestling beside the sausage, and to the pressed and mounted pink seaweed on the mantle among the sea stars and many shells. Against one of the pannelled walls of the room, too, there is a netting and some old cutlasses, one of them used by his great grandsire in the "Seven Years' War of Frederick," and another by Farragut aboard the Hartford. On another wall are strung old sealing tools and abalones, among the lot being a photo of the Golden Gate, taken on the one day of the year when the sun sets directly in the center. Abalones, too, which he polishes 6 hours or more, largely for amusement's sake, are likewise here, though the tourists, he claim, often steal more than they buy of them.

## Recent Railway Accidents and the Safety of Gas Lighting.

The *Journal of Gas Lighting* says that the public has been pretty well bombarded of late, by those whose interest it is extol the virtues of electric lighting, with references to the so-called vast superiority of their system of lighting from the point of view of safety; and, in the campaign, there has been no hesitation to make use (for the purpose of traducing gas lighting generally) of the attacks that Lieut.-Col. von Donop, one of the Inspectors of the Railway Department of the Board of Trade, has made upon the use of gas for lighting railway trains. Under the circumstances, it may not be altogether futile to inquire whether there is any substantial cause, from the standpoint of the public interest, for his aversion to gas lighting. Lieut.-Col. Donop's latest report, in which he again opposes gas as a railway illuminant, has relation to the deplorable railway disaster at Grantham; and we really fail to find that his conclusions have anything more tangible for their support than assumption, as has been the case in former reports from the same quarter. Not the slightest justification appears to be procurable from the evidence.

We are quite alive to the importance of, above all things, insuring the safety of the traveling public, but are equally alive to the fact that there has been no evidence adduced up to the present to show that gas as an illuminant for train lighting is not equally as safe as electricity. There is no doubt that great anxiety is felt by many interested in electricity at the considerable strides made by the introduction of incandescent gas mantles for the lighting of trains, and especially by those who are concerned in the fitting up of trains by electrical apparatus. For our own part, we are only interested in the matter from the point of view of the prevention of any detrimental influence being brought to bear upon the gas lighting industry by mistaken notions, prepossession, or whatever it may be, and the active use made by competitors of official views arising from one or other of such causes. We cannot shut our eyes, nor do the gas industry's competitors, to the commercial value to any system of lighting of such public exposition as the illumination of railway carriages gives. Hence the strenuous efforts of the electrical competitors to stem the ever rising tide of favor with which the system of incandescent gas lighting is regar ed by railway engineers; hence, too, our endeavor, in face of the experience as to safety over a long course of years, to counteract those efforts.

Before proceeding, let us see what Lieut.-Col. Donop says, on the question under consideration, in his report on the Grantham disaster. Among the opening paragraphs, he observes:

> The whole of the vehicles were lighted by gas with the exception of the eighth and ninth vehicles—namely, the sleeping car and composite carriage. These two vehicles were lighted entirely by electricity; but the sleeping car was also provided with a small gas cylinder for cooking purposes.

Then the important paragraph, in connection with our subject is the last one, in which the Inspector points out that fires broke out among the wrecked vehicles immediately after derailment. Then these sentences follow:

> It appeared that the *first* vehicle which caught fire was the ninth vehicle of the train which had come to rest half way down the embankment, with its center resting quite close to the fire-box of the engine. The central portion of this vehicle, which it should be noted was *one of those lighted by electricity, was badly burnt.* But there can, I think, be no doubt that the fire on this vehicle originated from the engine, and that it then spread to the other carriages lying near it. With regard to the fire amongst the vehicles at the bottom of the embankment, it was *impossible* to obtain any definite evidence as to how it originated. It may also have been due to fire from the engine; but from the suddenness with which the fire broke out, and from the fierceness with which it burnt, it is difficult to resist the conclusion that it was more probably due to an escape of the gas with which those vehicles were lighted. In any case, it seems certain that its intensity was considerably increased from that cause; and I consider that this accident points, as previous accidents have already done, to the unsuitability of gas as an illuminant for railway vehicles.

And why? It is an amazing thing that out of so much inconclusiveness anyone should feel security in drawing so definite a conclusion as that contained in the last twenty words, more especially in view of what is said as to the first vehicle that caught fire being an electrically lighted one, and that it was badly burned. If the fire originated from the engine in that case, there is just as good reason to suspect that the

one cause applies to the whole. Really, we fail completely to comprehend why Lieut.-Col. Donop should go out of his way to attempt to discredit a system of illumination which has proved beyond question to be the safest, most economical, and most efficient method of lighting railway vehicles ever devised. The system is no new or untried thing. It is a system that has a clean record of nearly 30 years' service, a system that is almost universally used, and a system that has received the approval of the world railway engineers. Therefore to state at this date that it is "unsuitable for the purpose" is extraordinary, and postulation pure and simple. When we say that the lighting of railway trains by gas has a "clean record," we do so advisedly, as in no instance during its long service—a service which now embraces the lighting of upwards of 200,000 coaches, not to mention locomotives and horse vehicles—has there been evidence to show that it has caused fire, neither has it been proved that it has even added to one. If the merits or demerits of a system are to be judged by hypothesis only, why, we ask, is not this method applied equally to electricity? Why are not the many horrors—horrors more easily imagined than described—of burst accumulator boxes, and the inevitable distribution of large quantities of dangerous acid over unfortunate passengers pinned beneath the wreckage, dilated upon? Why is no reference made to the ever present and serious danger of fire from the fusing of electric circuits—a danger fully recognized by Major Pringle in his report on the Cudworth accident, in which two electrically lighted coaches were destroyed by fire. Or if the safety of gas is in question, why is no mention made of danger from that given off from the batteries? Again we ask, "Why?"

As in this connection it will be interesting to review the reports of recent railway accidents when the question of the illumination of rolling stock has been touched upon, we give below extracts from those submitted by the various Board of Trade Inspectors. It is refreshing to note the absolute impartiality of the statements by Major Marindin and Major Pringle.

*Major Marindin's Report on the Thirsk Accident, Nov.* 2, 1892.—It should here be mentioned that the evidence makes it quite clear that the fire was not in any way due to the fact that the train was lighted by compressed gas, and it is nearly certain that it was caused by the wreckage catching light from the engine fire.

*Major Pringle's Report on the Cudworth Accident, Jan.* 19, 1905.—I have endeavored to find out how the carriages of the up express caught fire after the collision, but have failed to do so. Statements vary as to which coach first caught fire. It appears to have originated in either the fifth or sixth vehicle behind the engines. I am informed that both these coaches—one being an 8-wheeled bogie third-class coach, and the other a 12-wheeled bogie sleeping car—were lighted by electricity, and that the only gas reservoir was a small one on the sleeping car, which is utilized for heating water for the use of passengers. The fire did not break out immediately, but first appeared 5 minutes or more after the coaches had come to rest. Whether it was due to fire thrown out of the engine fire boxes, or to *fusing of electric circuits*, or to gas, there is no evidence to prove.

*Lieut.-Col. von Donop's Report on the Witham Accident, Sept.* 1, 1905.—Attention should also be drawn to the fact that one of the carriages was destroyed by fire, owing to the ignition of the gas in the cylinder underneath the framework. Fortunately no lives were lost thereby on this occasion; but the occurrence points to the desirability of adopting some other source of illumination, probably electricity.

*Lieut.-Col. von Donop's Report on the Catesby Tunnel Accident, Jan.* 4, 1906.—One other point in connection with this accident calls for mention. Three of the vehicles on the train were lighted by gas. All the lights in these vehicles were at once extinguished by the derailment and there was in consequence a great escape of gas. Fortunately, the officials of the company who were traveling in the train noticed the smell; and they at once took prompt measures to keep all naked lights away from these vehicles. Danger was thereby averted; but it is terrible to contemplate what might have been the results of this accident if an explosion had occurred or a carriage had caught fire in the tunnel. The leading and rear vehicles of the train were both lighted by electricity. The lights in the latter were extinguished; but in the former vehicle they remained alight throughout, and were of the greatest assistance in rescuing and controlling the passengers. This accident furnishes therefore another instance showing the undesirability of the employment of gas as an illuminant for trains, and the superiority of electricity for that purpose.

With reference to the Witham accident, the report does not disclose any evidence whatever to show how the coach took fire; and yet Lieut.-Col. von Donop makes a distinct statement to the effect that this was caused by gas, and suggests the use of "some other illuminant, probably electricity." Again, regarding the accident at Catesby Tunnel he states that, owing to the lights being extinguished in three of the vehicles, there was a great escape of gas; and he enters into suppositions as to what might have happened had this gas caught fire, or had there been an explosion. In this case, he openly advocates the use of electricity. In the report there is no indication that inquiry was made as to the amount of gas carried per coach, or that any details as to the amount of gas which was being passed by the gas burners were taken; neither is it stated that the railway officials present were, or were not, competent to judge as to the danger of fire. Yet notwithstanding the fact that no fire took place, the system is again not only branded as suspect, but is broadly condemned by Lieut.-Col. von Donop, and electricity is once more advocated. The evidence of Thomas Male, carriage examiner, shows that no defects at all were found in the undergear of the coaches, after a thorough examination. This makes it quite clear that the gas connections satisfactorily withstood the shock of the accident, and that there was no defect in the cylinders. The only escape of gas, therefore, that could have taken place must have been from the burners in the roof lamps; and from inquiries made as to the escape of gas from burners used for train lighting, we find that the maximum amount passed per burner is only about 0.75 cubic foot per hour. Nevertheless, this small amount (which could not by any possible chance have formed an explosive mixture in the tunnel) is magnified into a "great escape of gas." That a smell of gas might have been in evidence, we admit; but those conversant with oil gas know that a very small quantity will cause this, owing to its distinctive and pungent odor—a peculiarity which largely makes for safety in its use. It is, of course, quite conceivable that railway officials inexperienced in gas lighting, and with their nerves shaken by the accident, may have imagined a danger which had no existence.

Reverting to the Grantham accident, there is again no evidence to prove that gas was the cause of fire. On the contrary, it is distinctly declared that it was impossible to obtain any definite evidence as to how it originated, but it may have been due to fire from the engine. Strange it is, in face of this, that gas should be again "dragged in." As already mentioned, the first coach to catch fire was an electrically lighted one. It was badly burnt in the center—the position of the accumulator boxes; the fire apparently originating in the first place from the engine. No suggestion is made by Lieut.-Col. von Donop as to the intensity of the fire being increased by any accumulation of gas from the batteries. But there is no reason why his supposition should not have also turned in this direction.

To sum up, the reports of the accidents, as far as they refer to the subject in hand, indicate the following facts:

*Thirsk.*—It was quite clear that the fire was not in any way due to the fact that the train was lighted by gas.

*Cudworth.*—No evidence to prove how the fire broke out; but it might have been caused by the engine, by the fusing of electric circuits, or by gas. [*Note.*—The coaches were electrically lighted; and only a small gas cylinder was carried for the purpose of heating water.]

*Witham.*—It is stated that the fire was caused by gas; but there is absolutely no evidence to this effect.

*Catesby Tunnel.*—Three vehicles lighted by gas, but no fire.

*Salisbury.*—Entire train lighted by gas, but no fire.

From the above it is interesting to note that the, what may be termed "anti-gas" reports, emanate from one inspector. But there can be no doubt that the safety of gas as an illuminant is clearly proved, even if no account whatever is taken of its many years of efficient service. Regarding electricity, there may be seen in the coaches of at least one of the electric railways in London, conspicuous notices to the effect that the woodwork has been rendered proof against fire. This in itself is sufficient to prove that, where electricity is used, precautions against fire are necessary. Moreover, it cannot be said that the illumination of railway coaches by electricity has passed the experimental stage. The comparatively few coaches at present fitted have been found expensive in first cost of apparatus, expensive in maintenance, the apparatus is uncertain in action, a specially trained and experienced staff is required for continual "nursing," and the average light produced is no better than that yielded by properly regulated flat flame gas burners. Between the new system of carriage illumination by means of incandes-

cent gas mantles and the electric light there is no comparison. The light of the new lamps is not only infinitely superior to the electric light, but the cost of installation is much less, while the consumption of gas is so much reduced that the quantity necessary to be carried per coach is far less than formerly, with a consequent reduction in the expense of lighting.

It is altogether beyond comprehension why, among the Inspectors of the Board of Trade, Lieut.-Col. von Donop should alone have taken up the attitude he has done, without testimony being advanced that experience justifies his action. This experience does not do.

## Fires Caused by Electricity and Gas.

In his address at the last meeting of the Berlin District Gas Association, Herr Schaefer, of Dessau, remarked that statistics furnished by German insurance companies did not confirm the thought that fire risks had been diminished by substituting electric for gas lighting.

In 1883 the electricians were in high hopes that the "alleged immunity from fire risk" of electric lighting would enable them to get reduced rates from the insurance companies. Such reduction of rates was often spoken of, but never came to pass. In 1896 the Hanover Fire Insurance Company told their shareholders that the question of the comparative safety of electric lighting was by no means settled, but that clearly there could be no reduction of rates. In 1898 the German Association of Fire Insurance Companies memorialized the Imperial Chancellor, requesting him to put electrical installations under police control and supervision; and a year after they remarked on the considerable increase in the number of fires due to electricity. In 1901 the Dessau Gas Company inquired whether they could get reduced rates on replacing gas by electricity, and were told that under no circumstances could there be a reduction, but that there might be an increase unless the installation was put up and maintained according to the regulations of the Fire Insurance Association.

In Germany there are two groups of insurance companies—18 private companies and 36 public associations. Both of these groups have published some statistics. Those of the former group appeared in Neumann's "Vereinsblatt fur Deutsches Versicherungswesen;" those of the latter group in the year book of the "Mitteilungen fur die offentlichen Feuerversicherungsanstalten." The author has summarized these statistics in diagrams, which show that the fires caused by gas and electricity fall far below those due to explosion of spirit or petroleum, or to children playing with matches. In 1899 and 1900, children with matches caused 1,125 and 963 fires in the purview of the 18 private companies; explosions of mineral oil caused 1,583 and 1,627; electric failures caused 204 and 226; explosions of spirit (alcohol) 207 and 207; and gas explosions 158 and 199. Under gas explosions are reckoned acetylene, producer gas, oil gas and the like, as well as coal gas.

Unfortunately, these statistics of the 18 private companies were not continued in this form beyond the year 1900. The fires due to electrical causes in the years 1901–4 amounted, however, to 265, 238, 248 and 278 absolutely almost constant; but relatively to the increase in electric lighting, these figures show a diminution. In 1903 there were 98, in 1904 there were 208 fires due to explosions of alcohol—an enormous number, having regard to the small extent to which spirit has come into use. Petroleum lamps, matches, and the children who play with them, seem more in need of police supervision than electric installations do.

As to the 36 public insurance associations the results are much the same. Their data show the following:

| | 1897. | 1898. | 1899. | 1900. | 1901. |
|---|---|---|---|---|---|
| Total number of fires..... | 16,950 | 17,133 | 18,947 | 18,316 | 19,941 |
| Whereof caused by— | | | | | |
| Children and matches.... | 967 | 1,012 | 1,128 | 1,080 | 959 |
| Petroleum explosions.... | 367 | 362 | 414 | 354 | 415 |
| Gas explosions..... | 67 | 68 | 65 | 57 | 87 |
| Electricity..... | 22 | 25 | 51 | 42 | 73 |

During the 5 years, 5.64 per cent. of all the fires were occasioned by children playing with matches, 2.09 by petroleum explosions, 0.38 per cent. by gas explosions, 0.23 by electricity. The number of fires due to electricity increased much more rapidly, in comparison with those due to gas, than the relative expansions of electric and gas lighting would indicate. Here also "gas" included acetylene, etc., as well as coal gas. It is worthy of note that both gas and electricity were responsible for a relatively small number of fires.

The statistics of the Berlin fire department show that the number of fires have by no means kept pace with the expansion of the two systems; that out of every 900 electric services there is one fire per annum, while with gas there is only one fire per 8,000 services. In Berlin last year (1904–5) there were 12,788 fires, of which 30 were due to gas, 25 to electricity, 77 to children, 18 to petroleum.

During the 5 years, 1900–1 to 1904–5, there were 9 fires in electric works in Berlin; 1 in a gas works; 29 fires in electric works all over Germany. During the same period there were 66 fires in Berlin theaters, of which 21 were due to electricity; once to four times in almost every Berlin theater; and it was only the continuous supervision which prevented these becoming dangerous. During the same period 32 shops were set on fire by electricity.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Danbury and Bethel (Conn.) Gas and Electric Light Company proposes to remodel its electric lighting plant, and add thereto 400 kw. capacity. The plant includes additions to the steam equipment, storage for coal and the necessary electrical apparatus. Messrs. W. S. Barstow & Co., of New York and Portland, Ore., have the work in charge.

THAT the Western Gas Construction Company, of Fort Wayne, Ind., is getting its share of work would seem to be shown in the following list of contracts recently received by it: A complete coal gas plant, including benches, condensing and purifying system for Cartersville, Ga. This plant is to be constructed for and to be operated by the city authorities. A complete water gas plant for the Gainesville (Tex.) Gas and Fuel Company. This contract provides for a 5-foot, double superheater set, purifiers, meter and a 100,000 foot capacity double lift holder in steel tank. At Goldfield, Nev., the contract calls for the construction of two 6 foot 6-inch oil gas sets, 2 twin purifiers, 14 feet by 14 feet by 5 feet, with boilers, meter and compressors, and a 50,000-foot capacity storage holder to rest in steel tank. For Gettysburg, Pa., a 3-foot 9-inch double supefheater water gas apparatus. For Oroville, Cal., a 6-foot oil gas plant, including purifiers, intermediate connections, etc. The Construction Company is completing a water gas set at Shippensburg, Pa., and another 3-foot 9-inch double superheater water gas set for Columbia, Pa.—this contract includes a 40,000 capacity storage holder to rest in steel tank. Next come holders, respectively, at Watkins, N. Y., of 40,000 cubic feet capacity, and at Fredonia, N. Y., of 40,000. Both holders are to rest in steel tanks.

HEALTH COMMISSIONER WENDE, of Buffalo, N. Y., is urging upon Councils the necessity for an ordinance prohibiting the use of gas heating stoves unless proper flue connections are installed.

MAYOR JOHN W. BOEHNE, of Evansville, Ind., is urging upon the city the importance of operating a gas and electric lighting plant on municipal account. Wonder his Honor wouldn't take a flying trip to the not-far-away city of Hamilton, O.

THIS decision explains itself—it was forwarded by Mr. F. W. Ryan: "An ordinance enacted by the Mayor and Council of the city of Omaha, Neb., regulating the construction of buildings in said city, which provides that it shall be unlawful to erect a gas tank or holder therein, without the written consent of the owners of all the property within a radius of 1,000 feet from the site of said structure, is, as to such proviso, void."

THE Louisville (Ky.) Gas Company has leased the building now devoted by it to office purposes for a year from September 1. This, however, may not be taken as meaning that the Company has abandoned its proposed plans for constructing an office building on Chestnut street, for Messrs. Snead, Bishop and Barret have too much good business acumen to allow the project for a suitable office site and structure to slumber indefinitely.

NEGOTIATIONS have been completed under which the Citizens Gas and Coke Company, the Grand Junction (Col.) Electric and Gas Company and the Grand Junction Ice and Storage Company will consolidate their properties.

"P. T. B." is informed that the last dividend declared on the shares of the Consolidated Gas and Electric Company, of San Diego, Cal., ha

been payable since the 12th inst. It was 1¼ per cent., payable to holders of record the 10th inst.

THE proprietors of the Wallingford (Conn.) Gas Light Company have petitioned the State authorities for the right to distribute gas in the districts of Southington and Cheshire.

MR. D. A. TILLEY has resigned the position of paymaster to the Westchester (N. Y.) Lighting Company to take charge of the commercial department of the Dallas (Tex.) Gas Company.

MR. P. H. MULHOLLAND has been appointed receiver for, with instructions to wind up the affairs of the United States Safety Gas Cock Company, of Providence, R. I.

AT the annual meeting of the Winsted (Conn.) Company the Directors chosen were: R. E. Holmes, Henry Gay, H. L. Roberts, M. H. Tanner, I. R. Griswold, E. B. Parsons, Edward Clarke, Henry Skinner and F. M. Travis. It was voted to increase the capital stock in the sum of $50,000, the proceeds to go to paying for a comprehensive scheme of plant improvements.

THE Board of Council, Eaton, O., has granted a franchise to certain capitalists of Hamilton, O., to construct and operate a gas plant. It will be of the coal gas type.

MR. C. N. PAYNE, of New York, has been elected President of the Northwestern Natural Gas Company, vice the late Mr. Daniel O'Day. The latter's son, Daniel O'Day, Jr., fills the vacancy on the Board of Directors caused by his father's death.

MR. ADELBERT D. CARPENTER, who resigned a fortnight or so ago from the service of the Rome (N.Y.) Gas, Electric and Power Company, to act as Superintendent of the McKeesport (Pa.) Gas and Improvement Company, was agreeably surprised the other day. The employees of the Rome Company presented him a watch chain and jewelled signet charm, the giving-away speech being well spoken by Superintendent R. A. Field. The chained one responded as best he could—the Boss's speech having temporarily put him out of self-possession—and he goes to his new field with the best of good wishes from his former associates.

AT the annual meeting of the Omaha (Neb.) Gas Company the Directors elected were: F. T. Hamilton, S. T. Bodine, George W. Clabaugh, George E. Barker and George E. Prichard; President, F. T. Hamilton; Vice President and Secretary, George W. Clabaugh; Treasurer and Chief Engineer, Isaac Battin; Asst. Treas., Lewis Lillie; Asst. Secretary, James Ball.

MR. JOHN MCSWEENY, as Receiver for the Wooster (O.) Gas Company, has determined not to close down the plant.

GAS was made on commercial account for the first time in the new St. Cloud (Minn.) plant the morning of the 9th inst. President Whitney put in the first shovelful of coal—it was likely the greatest physical effort made by him in a twelvemonth—and Superintendent Spiering handled the next one. He knew how to do it, though.

THE proprietors of the Calumet (Mich.) Company assert that their gas will be in the town not later than the 15th prox.

THE proprietors of the Freeport (Ills.) Gas Company have offered to reduce the gas rate to $1.05 on April 1st next, and to $1 on January 1st, 1908, provided the authorities will grant them a 20-year franchise extension.

THE proprietors of the Elizabeth (N. J.) Gas Company have just closed a contract with the Gas Machinery Company, of Cleveland, O., under which the latter will install for the former two 10-foot water gas sets, complete, four 24 feet by 18 feet by 8 feet duplex purifiers, fitted with the Gas Machinery Company's independent, reverse-flow valve, a water gas washer, elevators, 2 boilers, and other necessary equipment for an up-to-date water gas plant. This will involve the construction of new buildings.

MR. DAVID FRAZIER, Treasurer and General Manager of the Battle Creek (Mich.) Gas Company, has been elected President of the Battle Creek Business Men's Association. There can be no doubt about it that the Beau Brummel of Battle Creek is well fitted to direct the affairs of the Association which has done such excellent work for the development of that city.

MR. W. D. WOODSON, for many years Cashier of the St. Joseph (Mo.) Gas Company, has resigned. His successor is Mr. D. E. Lamb. The Company has discontinued its new business department.

"A. L. C.," writing from Boston, Mass., under date of the 12th inst., says: "The Board of Gas and Electric Light Commissioners has transmitted its report to the lower branch of the Massachusetts Legislature respecting its investigation of means and methods for equipping gas burners with automatic shutoffs. In the report the Commissioners say that a public hearing over the matter was held in September, at which hearing the attendance was confined practically to the engineers of the Boston Gas Companies and to a dealer in gas apparatus. The Board wrote to the principal gas companies throughout the country, but no Company knew of any such devices that were in successful or satisfactory operation. Letters were also sent to the 80 patentees having such devices on file in the Patent Office, and a number of samples were received in reply. The Board remarks that the practical value of devices of this sort must depend largely upon the regularity and certainty with which they may work in the hands of the dissipated, careless or ignorant, and the length of time it will continue to be efficient. Prof. Charles L. Norton, Mass. Inst. Tech., was employed to make a thorough test. The Board finds that it is mechanically feasible to equip gas fixtures with self-closing devices, but that none of the devices has yet had sufficient actual use to fully measure their efficiency, reliability and durability. The Board in that connection positively asserts: 'A reliance upon devices in whose favor no more can be said affirmatively than has been herein stated is likely to increase rather than to diminish the dangers now existing.' For these reasons the Board thinks it inadvisable to compel the use of such fixtures, but that such use should be left to private judgment and responsibility. Prof. Norton submitted a report upon the tests which he made, in which he says that 12 years' of practical experience with thermal expansion devices compels him to withhold his approval from any and all of the devices, and to express the belief that the use of them in their present condition would be a positive source of danger."

THE proprietors of the Orange County Lighting Company, of Middletown, N. Y., have demanded a uniform rate of $1.25 per 1,000 cubic feet on gas used on all accounts. When a quantity amounting to over 50,000 cubic feet per month is used a special rate will be made. The concession dates from the 1st inst. Heretofore the rates ran from $1.10 per 1,000 on fuel account, and from $1.50 to $2 per 1,000 for an illuminating use. President Purdy and his associates are to be congratulated on the success which is attending their management of the gas division of the enterprise, in which expression we are not to be taken as meaning that they have been remiss in their direction of its electric division. On the contrary, they have done remarkably well with the latter, considering the load of capital that burdens it.

NEGOTIATIONS are underway for a change in control of the Federal Gas Company, of Boulder, Col.

"T. J. F.," writing from Washington, D. C., under date of the 14th inst., referring to the Madden bill to regulate gas rates in the District of Columbia, remarks that the indications, judging by the public hearings before the Commissioners and keeping in the physical eye the direction of the compass to which the straws are pointing, are these: Nothing will be done this session, with the likelihood we are to have by the next House an up-to-date expert investigation; so, then, it lays *in ovo*.

THE Gas Bench Construction Company, of St. Louis, Mo., has been awarded contracts for the construction of the new benches of 9's, to be erected in the plant of the Dallas (Tex.) Company, and the settings of 6's for the new works now in process of building at Greeley, Col.

SASKATCHEWAN was created a district of Canada in 1882. It then had "4 centers of population"—So. Assiniboia, East Keewatin, Winnipeg, and West Alberta. It now has within its limits four gas works, and a fifth is projected for Regina, those interested in the venture being capitalists of Cleveland, O. Twenty years ago the section where Regina now stands was a trappers' trading station; to-day it has a population of 10,000 people, and is noted for its mining activities.

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
*Germany*—Lemcke & Buechner, of New York.
*England*—Aug. Siegle, 30 Lime Street, London.

MONDAY, JANUARY 21, 1907.

## The Market for Gas Securities.

The city gas share situation remains unchanged, although several hundred lots were disposed of in Consolidated. There is much adverse criticism on the action of the Directors of the Brooklyn Union Gas Company in refraining altogether from making any return on the stock. The money to pay *at least* 2 per cent. is certainly in the treasury. Messrs. Leggett, Rogers, Rockefeller, and some of their conferes may be able to stand the grind, but there are hundreds which this action sadly, yes, woefully hampers. To the latter we would say by no means let go of your stock.

The annual report of the American Light and Traction Company vividly explains the first increase in the value of the shares the past twelvemonth. Massachusetts gas goes on and up, and the end of the movement is not yet. The dividend on the preferred of the Helena (Mont.) Railway and Light Co., of 1¼ per cent. for the quarter, is payable the 31st inst.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

JANUARY 21.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

| *N. Y City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated | $73,177,000 | 100 | | 137 |
| Central Union Gas Co.— | | | | |
| 1st 5's, due 1972, J. & J. | 2,000,000 | 1,000 | 101 | 104 |
| Equitable Gas Light Co.— | | | | |
| Con. 5's, due 1932, M. & S. | 1,000,000 | 1,000 | .. | 105 |
| Mutual | 3,500,000 | 100 | 190 | 225 |
| New Amsterdam Gas Co.— | | | | |
| 1st Con. 5's, due 1948, J. & J. | 11,000 000 | 1,000 | 98½ | 100 |
| New York & Richmond Gas Co. (Staten Island) | 1,500,000 | 100 | 37 | 43 |
| 1st Mtg. Gold Bds. 5 p.ct. | 1,000,000 | .. | 98 | 104 |
| Northern Union— | | | | |
| 1st 5's, due 1927, J. & J. | 1,250,000 | 1,000 | 101 | 103 |
| New York and East River— | | | | |
| 1st 5's, due 1944, J. & J. | 3,500,000 | 1,000 | 108 | 111 |
| Con 5's, due 1945, J. & J. | 1,500,000 | .. | 104 | 110 |
| Standard | 5,000,000 | 100 | 140 | 160 |
| Preferred | 5,000,000 | 100 | 155 | 175 |
| 1st Mtg. 5's, due 1930, M. & N | 1,500,000 | 1,000 | 104 | 108 |
| The Brooklyn Union | 15,000,000 | 1,000 | 110 | 120 |
| 1st Con. 5's, due 1948, M. & N | 15,000,000 | | 107 | .. |
| Yonkers | 299,650 | 500 | 130 | .. |
| *Out-of-Town Companies.* | | | | |
| Bay State | 50,000,000 | 50 | 5/8 | ¾ |
| " Income Bonds | 2,000,000 | 1,000 | .. | 75 |
| Binghamton Gas Works | 450,000 | 100 | .. | 65 |
| " 1st Mtg. 5's | 509,000 | 1,000 | 95 | 100 |
| Boston United Gas Co.— | | | | |
| 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000.000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 9 | 10 |
| " " Bonds, 5's | 5,250,000 | 1,000 | 75 | 80 |
| Capital, Sacramento | 500,000 | 50 | .. | 35 |
| Bonds (6's) | 150,000 | 1.000 | .. | .. |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,650,000 | 1,000 | 104 | 106¾ |
| Cincinnati Gas and Electric Co. | 29,500,000 | 100 | 99¾ | 100¼ |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,500,000 | 1,000 | 90 | .. |
| Columbus (O.) Gas Lt. & Heating Co | 1,682,750 | 100 | .. | 95 |
| Preferred | 3,036,500 | 100 | 107½ | 108 |
| Consumers, Toronto | 2,300,000 | 50 | 200 | 204 |
| Consolidated, Baltimore | 11,000,000 | 100 | . | 90 |
| Mortgage, 6's | 3,000,000 | .. | .. | 118 |
| Chesapeake, 1st 6's | 1,000,000 | .. | .. | .. |
| Equitable, 1st 6's | 910,000 | .. | .. | .. |
| Consolidated, 1st 5's | 1,490 000 | .. | .. | 112 |
| Consolidated Gas Co. of N.J. | 1,000,000 | 100 | 15 | 17 |
| Con. Mtg. 5's | 980,000 | 1,000 | 92 | 95 |
| Bonds | 75,000 | .. | .. | 100 |
| Detroit City Gas Co. | 5,000,000 | 50 | .. | 50 |
| " Prior Lien 5's | 4,618,000 | 1,000 | .. | 98 |
| Detroit Gas Co., 5's | 981,000 | 1,000 | 75 | 80 |
| " Inc. 5's | 16,000 | 100 | 98½ | 100 |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | .. | 101 |
| Essex and Hudson Gas Co. | 6,500,600 | .. | 39 | 40 |
| Fort Wayne | 2,000,000 | .. | .. | .. |
| " Bonds | 2,000,000 | .. | 55 | .. |
| Grand Rapids Gas Lt. Co. 1st Mtg. 5's | 1,225,000 | 1,000 | 104½ | 105 |
| Hartford | 750,000 | 25 | 190 | 200 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | .. | 110 | 112 |
| " Bonds, 5's | 10,500,000 | .. | 107½ | 108½ |
| Indianapolis | 2,000,000 | .. | 60 | 70 |
| " Bonds, 5's | 2,650,000 | .. | 104½ | 105 |
| Jackson Gas Co. | 250,000 | 50 | 82 | .. |
| " 1st Mtg. 5's | 290,000 | 1,000 | 97 | 100 |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | .. | 36 |
| Bonds, 1st 5's | 3,892,000 | 1,000 | 102 | 104 |
| Laclede, St. Louis | 10,000,000 | 100 | .. | 05 |
| Preferred | 2,500,000 | 100 | 95 | 110 |
| Bonds | 10,000,000 | 1,000 | 104 | 104½ |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | .. | 60 |
| Bonds | 1,000,004 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 143 | 145 |
| Madison Gas & Elec. Co. | | | | |
| " 1st Mtg. 6's | 350,000 | 1,000 | 106 | 108¾ |
| " 6 per cent. scrip, due 1910 | 100,000 | 25 | 85 | 87 |
| Massachusetts Gas Companies of Boston | 25,000,000 | 100 | 65¼ | 66 |
| Preferred | 25,000,000 | 100 | 85½ | 86 |
| Montreal, Canada | 2,000,000 | 100 | 218 | 218¾ |
| Nashville Gas Lt. Co. | 1,000,000 | 100 | 110 | .. |
| Newark, N. J., Con. Gas Co. | 6,000,000 | .. | 56 | 58 |
| Bonds, 6's | 6,000,000 | .. | 137 | 138 |
| New Haven | 2,000,000 | 25 | 200 | .. |
| Peoples G. L. & Coke Co., of Chicago | 25,000,000 | 100 | 96¾ | 96⅞ |
| Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage | 20,100,000 | 1,000 | .. | .. |
| " 2d " | 2,500,000 | 1,000 | 104 | .. |
| Rochester Gas & Elec. Co. | 2,150,000 | 50 | 88 | .. |
| Preferred | 2,150,000 | 50 | 118 | .. |
| Consolidated 5's | 2,000,000 | .. | 104½ | 105¼ |
| San Francisco, Cal. | 15,800,000 | 100 | .. | .. |
| St. Joseph Gas Co. 1st Mtg. 5's | 751,000 | 1,000 | 92 | .. |
| St. Paul Gas Light Co | 1,500,000 | 100 | 45 | 47 |
| 1st Mortgage 6's | 650,000 | 1,000 | 113 | 116 |
| Extension, 6's | 600,000 | 1,000 | 113¾ | 115 |
| General Mortgage, 5's | 2,465,000 | 1,000 | 96¼ | .. |
| Syracuse, N. Y. | 1,975,000 | 100 | 50 | 55 |
| Bonds | 2,047.000 | 1,000 | 102 | .. |
| Washington, D. C | 2,600,000 | 20 | 281⅜ | 285 |
| First mortgage 6's | 600,000 | .. | .. | .. |
| Western, Milwaukee | 4,000,000 | .. | .. | .. |
| Wilmington, Del. | 600.000 | 50 | 220 | .. |

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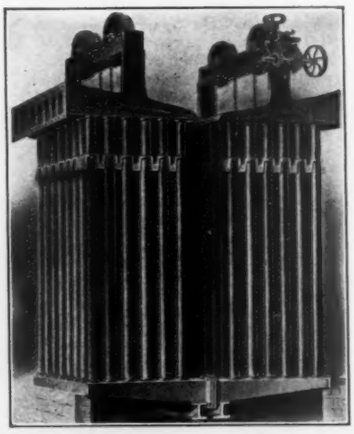

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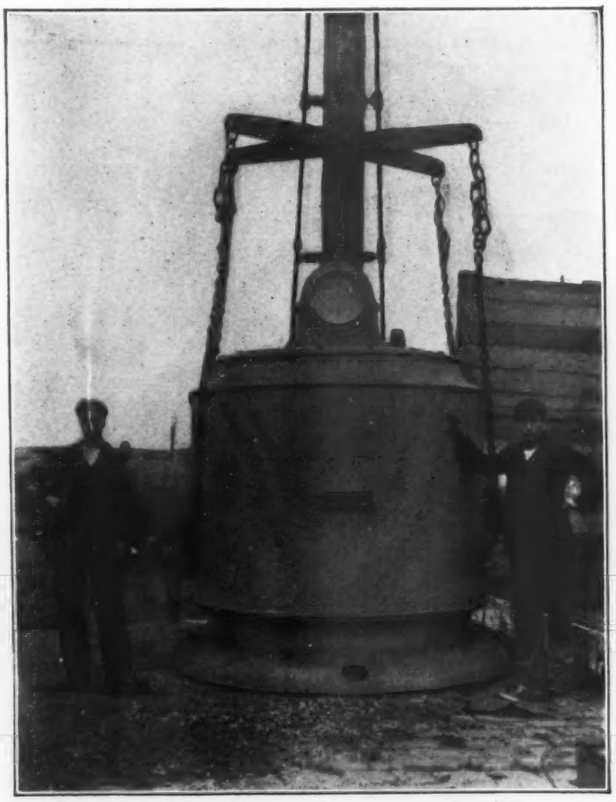

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**Dimensions: Base 84 in.; Face to Face, Flanges 108 in.; Height 99½ in.; Connections 20 in.**

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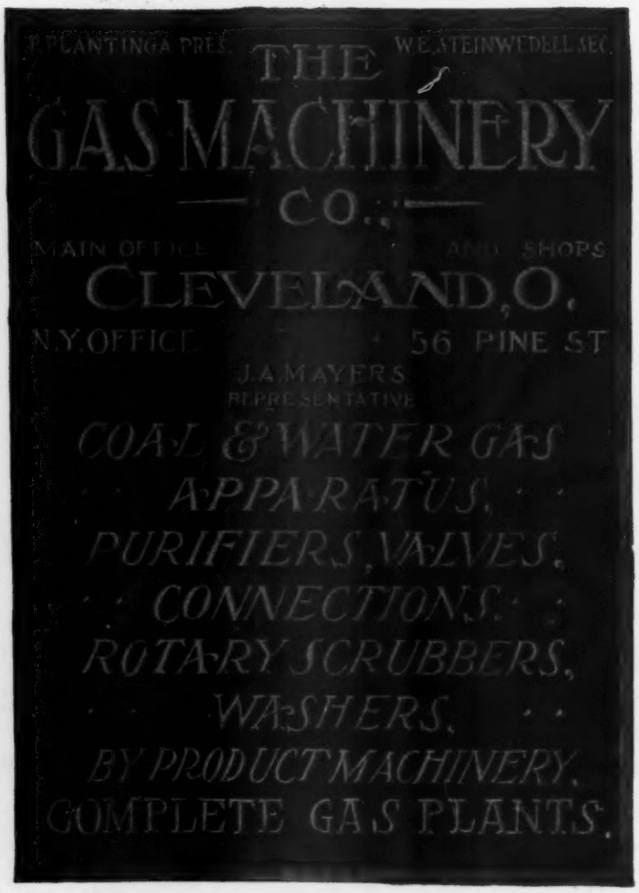
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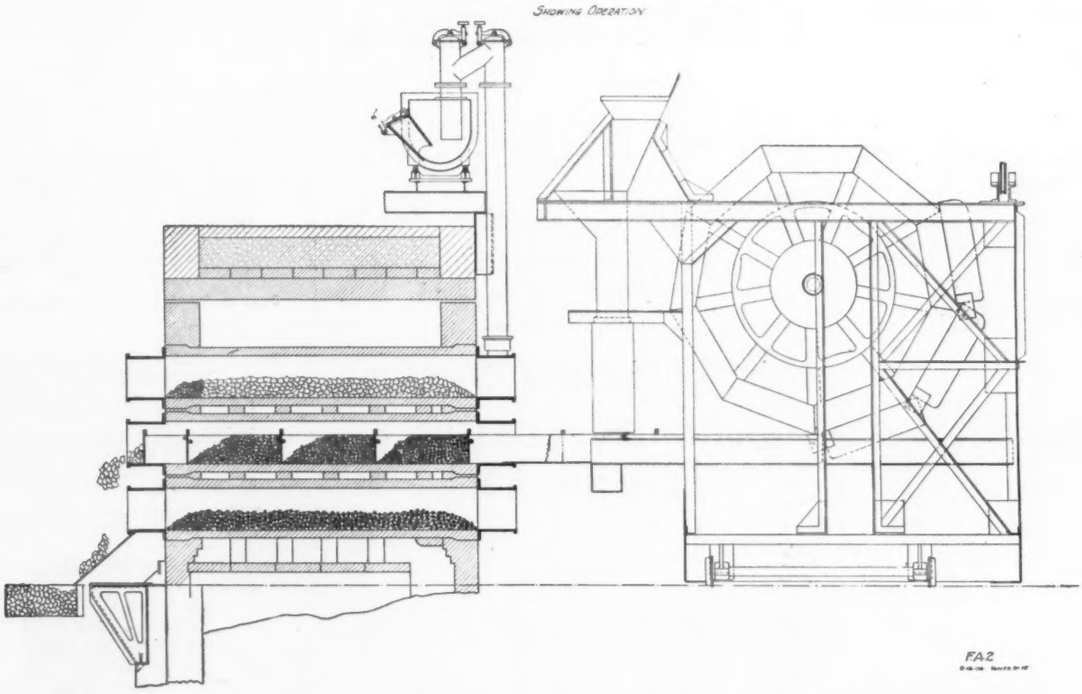

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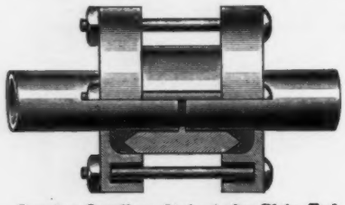
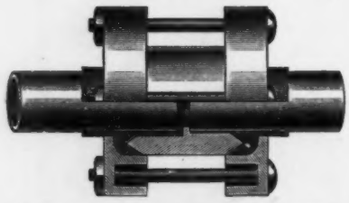
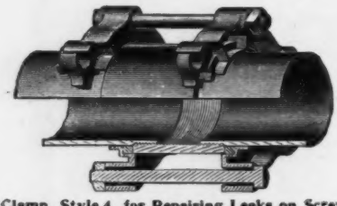
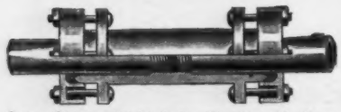

Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.


Insulating Coupling, Style 8, for Plain End Wrought Iron Pipe,


Clamp, Style 4, for Repairing Leaks on Screw Collar.


Long Sleeve, Style 2, for Mending Broken Lines.

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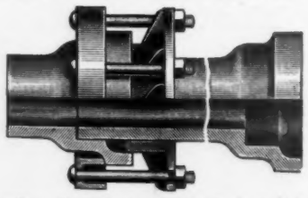
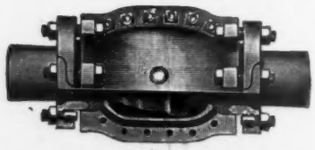
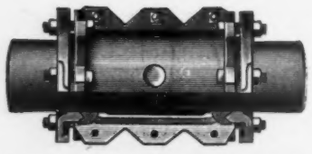
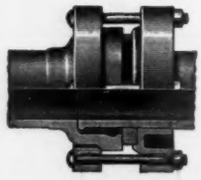

Coupling, Style 9, for Special Style Cast Iron Pipe.


Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.


Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.


Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

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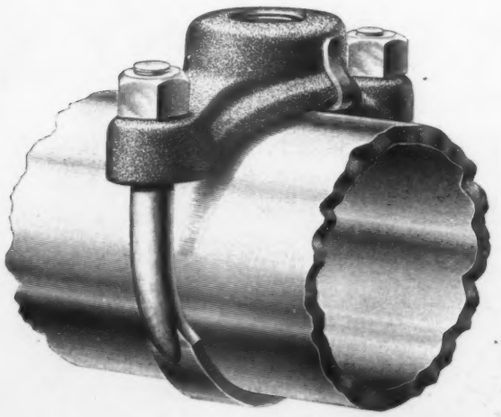

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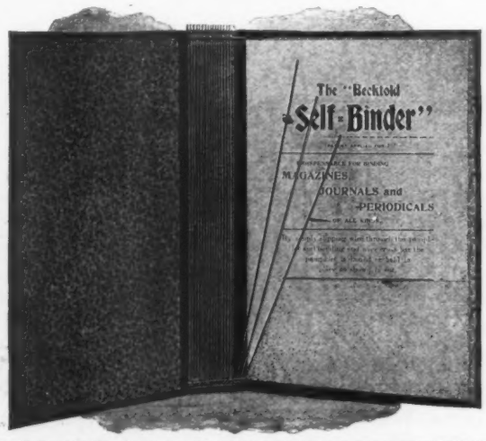


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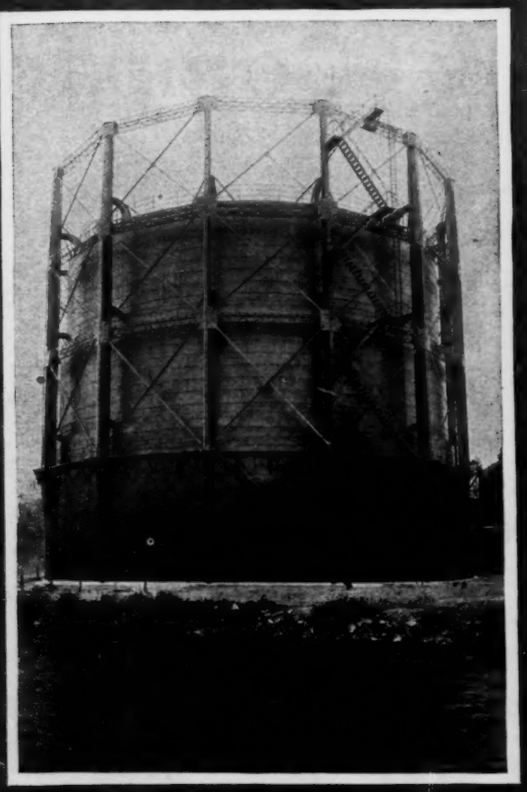

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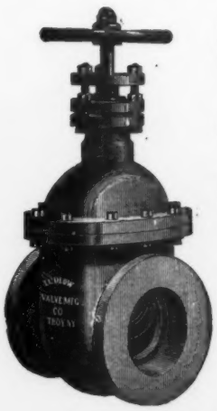

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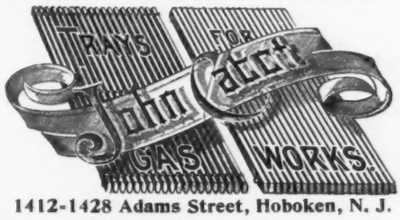


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| " 1 | 34 00 | ¾ " | 2 | 31 " | 10¾ " | 62 " |
| Contact 6 | 2 .00 | ¾ " | 3 | 29½ " | 12 " | 60 " |
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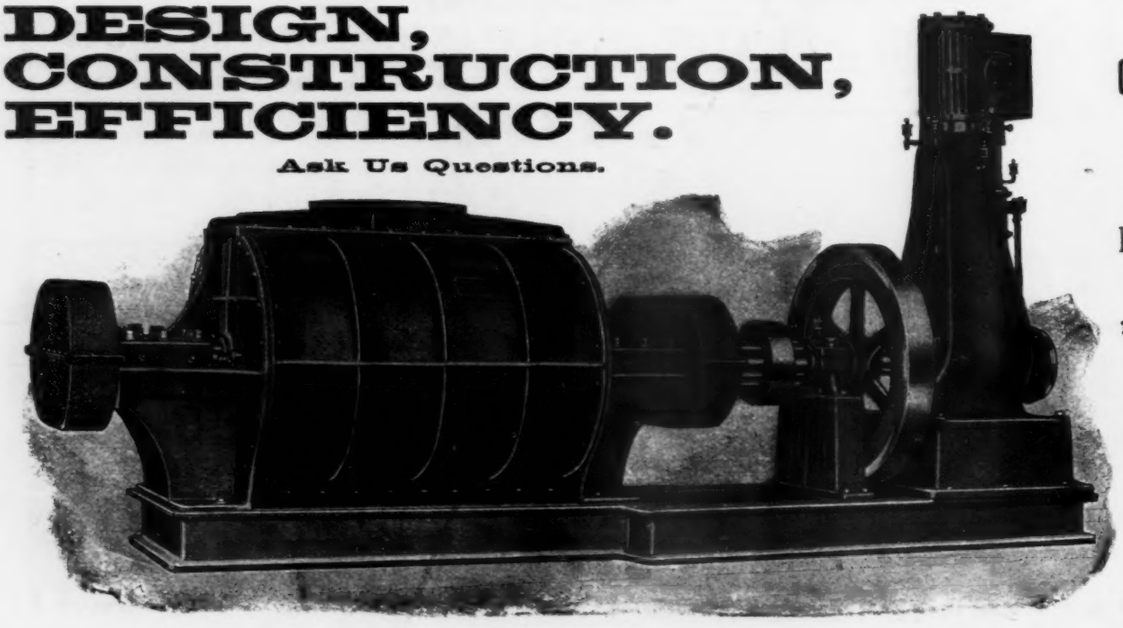

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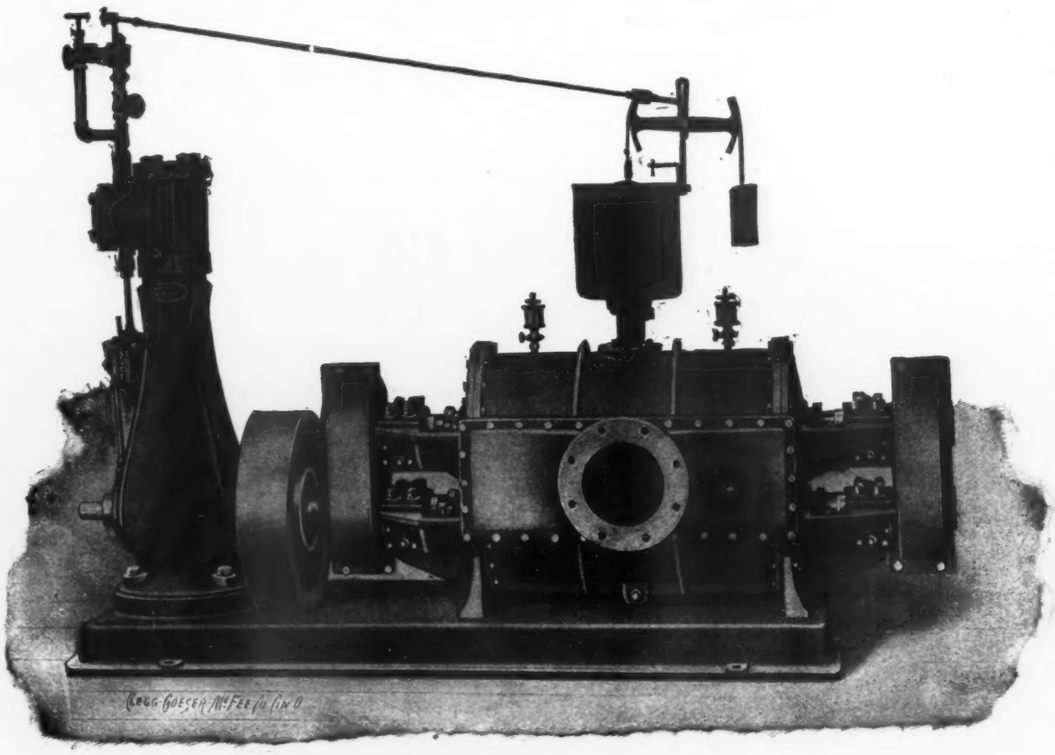

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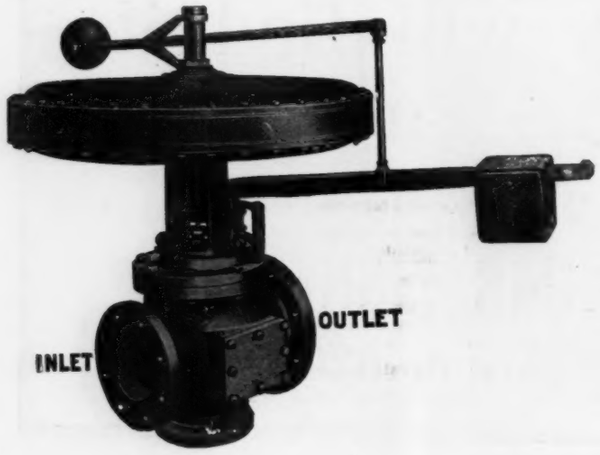


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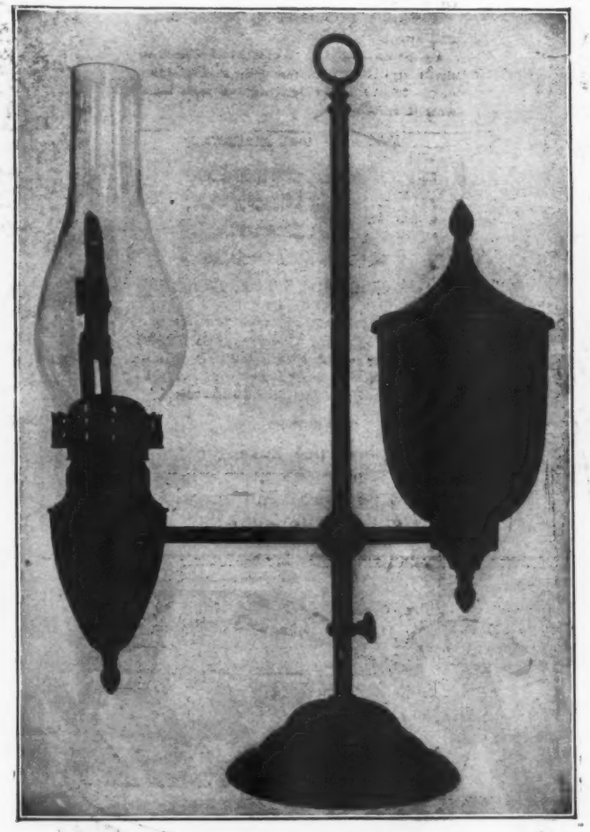
## Photometrical and Experimental Apparatus.


### PUBLIC LIGHTING TABLE.

**FEBRUARY, 1907.**

**Table No. 1.**
FOLLOWING THE MOON.

| Day of Week. | Date. | Light. | Extinguish. |
|---|---|---|---|
| Fri. | 1 | 5.50 PM | 9.30 PM |
| Sat. | 2 | 5.50 | 10.30 |
| Sun. | 3 | 5.50 | 11.40 |
| Mon. | 4 | 5.50 | 12.50 AM |
| Tue. | 5 | 5.50 LQ | 1.50 |
| Wed. | 6 | 5.50 | 3.00 |
| Thu. | 7 | 5.50 | 4.10 |
| Fri. | 8 | 5.50 | 5.20 |
| Sat. | 9 | 5.50 | 6.00 |
| Sun | 10 | 6.00 | 6.00 |
| Mon. | 11 | 6.00 | 6.00 |
| Tue. | 12 | 6.00 NM | 6.00 |
| Wed. | 13 | 6.00 | 6.00 |
| Thu. | 14 | 6.00 | 6.00 |
| Fri. | 15 | 6.00 | 6.00 |
| Sat. | 16 | 6.00 | 6.00 |
| Sun. | 17 | 10.00 | 5.50 |
| Mon. | 18 | 11.00 | 5.50 |
| Tue. | 19 | 12.00 FQ | 5.50 |
| Wed. | 20 | 12.50 AM | 5.50 |
| Thu. | 21 | 1.50 | 5.50 |
| Fri. | 22 | 2.40 | 5.50 |
| Sat. | 23 | 3.30 | 5.50 |
| Sun. | 24 | 4.10 | 5.40 |
| Mon. | 25 | 4.50 | 5.40 |
| Tue. | 26 | No L. | No L. |
| Wed. | 27 | No L FM | No L. |
| Thu. | 28 | No L. | No L. |

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10-Candle Power.

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**2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.**

**3d. It is much less dangerous than Pentane, which is a kind of gasolene.**

**4th. It is not easily affected by air currents in the photometer room.**

**5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.**

**6th. The first cost of the lamp brings it within the reach of even small gas works.**

**7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.**

**8th. Is not affected by the weather.**


### TOTAL HOURS DURING 1907.

**By Table No. 1.**

| | Hrs.Min. |
|---|---|
| January | 211.10 |
| February | 193.40 |
| March | 182.10 |
| April | 167.00 |
| May | 157.00 |
| June | 145.30 |
| July | 151.50 |
| August | 162.30 |
| September | 175.30 |
| October | 202.40 |
| November | 209.30 |
| December | 231.50 |
| Total, yr. | 2190.20 |

### PUBLIC LIGHTING TABLE.

**FEBRUARY, 1907.**

**Table No. 2.**
NEW YORK CITY.
ALL NIGHT LIGHTING.

| Day of Week. | Date. | Light. | Extinguish. |
|---|---|---|---|
| | | P. M. | A.M. |
| Fri. | 1 | 5.05 | 6.15 |
| Sat. | 2 | 5.05 | 6.15 |
| Sun. | 3 | 5.05 | 6.15 |
| Mon. | 4 | 5.05 | 6.15 |
| Tue. | 5 | 5.10 | 6.10 |
| Wed. | 6 | 5.10 | 6.10 |
| Thu. | 7 | 5.10 | 6.10 |
| Fri. | 8 | 5.10 | 6.10 |
| Sat. | 9 | 5.10 | 6.10 |
| Sun. | 10 | 5.10 | 6.10 |
| Mon. | 11 | 5.10 | 6.10 |
| Tue. | 12 | 5.20 | 5.55 |
| Wed. | 13 | 5.20 | 5.55 |
| Thu. | 14 | 5.20 | 5.55 |
| Fri. | 15 | 5.20 | 5.55 |
| Sat. | 16 | 5.20 | 5.55 |
| Sun. | 17 | 5.20 | 5.55 |
| Mon. | 18 | 5.20 | 5.55 |
| Tue. | 19 | 5.30 | 5.55 |
| Wed. | 20 | 5.30 | 5.55 |
| Thu. | 21 | 5.30 | 5.55 |
| Fri. | 22 | 5.30 | 5.55 |
| Sat. | 23 | 5.30 | 5.55 |
| Sun. | 24 | 5.30 | 5.55 |
| Mon. | 25 | 5.30 | 5.55 |
| Tue. | 26 | 5.30 | 5.45 |
| Wed. | 27 | 5.30 | 5.45 |
| Thu. | 28 | 5.30 | 5.45 |

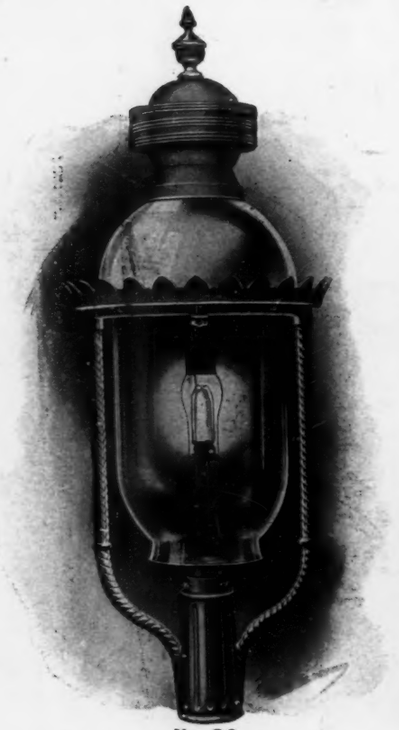
### TOTAL HOURS DURING 1907.

**By Table No. 2.**

| | Hrs.Min. |
|---|---|
| January | 423.20 |
| February | 355.25 |
| March | 355.35 |
| April | 298.50 |
| May | 264.50 |
| June | 234.25 |
| July | 243.45 |
| August | 280.25 |
| September | 321.15 |
| October | 374.30 |
| November | 401.40 |
| December | 433.45 |
| Total, yr. | 3987.45 |

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

# WELSBACH STREET LIGHTING COMPANY



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**Memphis, Tenn.** (2d contract).
**Council Bluffs, Ia.** (2d contract).
**Seattle, Wash.** (2d contract).
**Philadelphia, Pa.**
**Waterbury, Conn.**
**Manchester, N. H.**
**Allentown, Pa.**
**Omaha, Neb.**
**Muskegon, Mich.**
**Nazareth, Pa.** (2d contract).
**Lewistown, Pa.**
**Greenville, Tex.**
**New York,** Cent. Un. (3d contract).
**Jefferson City, Mo.**
**Peekskill, N. Y.** (2d contract).
**Waterville, Me.**
**Washington, D. C.** (4th contract).
**Lawrence, Mass.** (3d contract).
**Hampton, Va.**
**Aurora, Ills.** (2d contract).
**Milwaukee, Wis.**
**Syracuse, N. Y.** (2d contract).
**Davenport, Ia.**
**S. Brooklyn, N. Y.** (3d contract).
**Delray, Mich.**
**Albert Lea, Minn.** (2d contract).
**Leominster, Mass.** (2d contract).
**Clinton, Mass.**

TOTAL SETS INSTALLED IN 1906, . . . . . 41
TOTAL SETS TO DATE, . . . . . 634
TOTAL DAILY CAPACITY, . . . . . 502,555,000 cu. ft.

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Gas Analysis Apparatus.
Recording Gauges.
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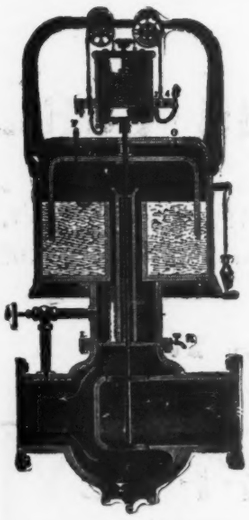

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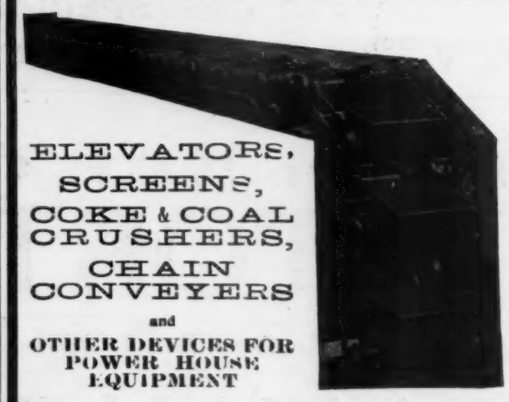

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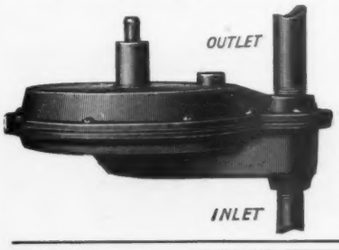


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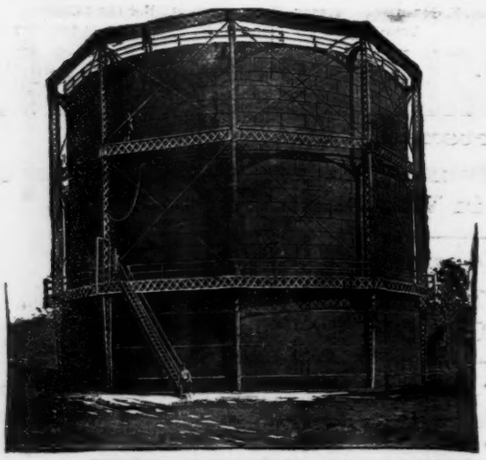

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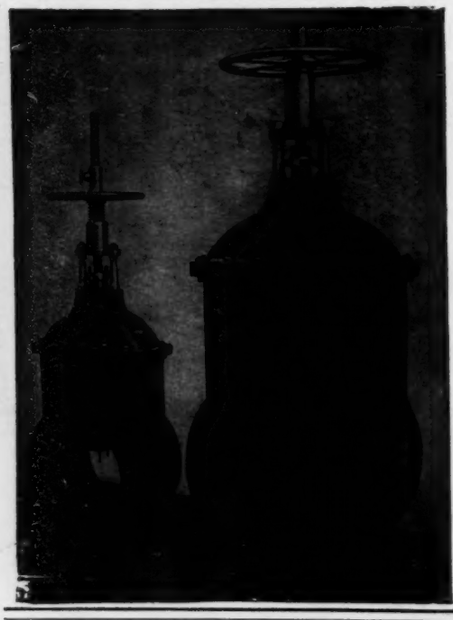

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| Size. | 8 Inches. | 10 Inches. | 12 Inches | 16 Inches. | 20 Inches. | 24 Inches | 30 Inches. | 36 Inches. |
|---|---|---|---|---|---|---|---|---|
| Diameter of flanges..... | 13 inches. | 16 inches. | 18 inches | 22½ inches. | 27 inches. | 3 inches. | 37½ inches | 44 inches. |
| Face to face of flange... | 12 inches. | 12 inches. | 12 inches | 14 inches. | 17 inches | 20 inches. | 21 inches. | 23⅞ inches. |

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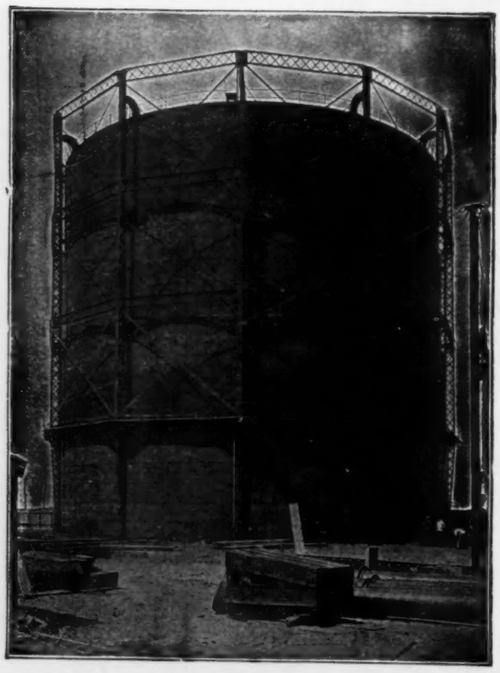

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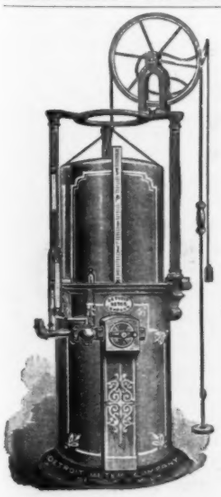

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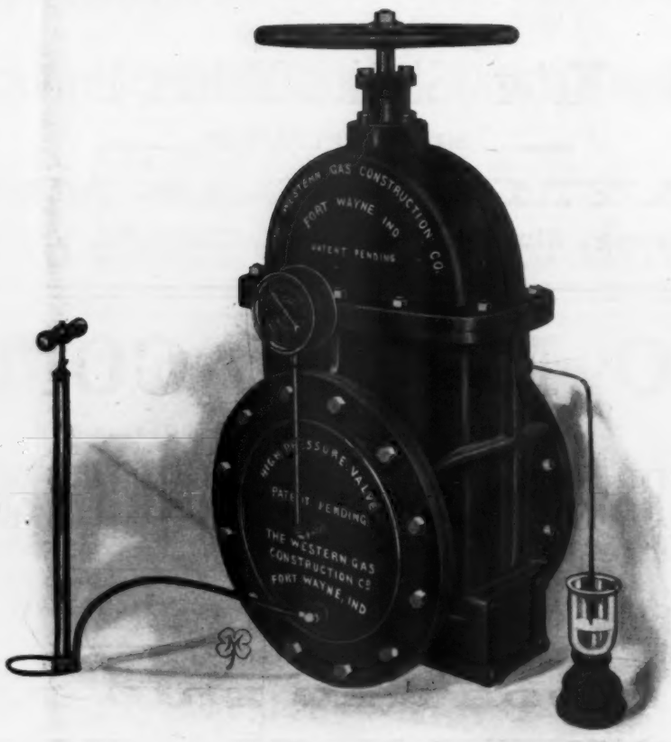


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